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Issued March 26, 1913.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—BULLETIN No. 92.

MILTON WHITNEY, Chief.

WELLS AND SUBSOIL WATER.

BY

W J McGEE,

Expert in Charge, Soil Water Investigations.

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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Soils,
Washington, D. C., August 15, 1912.

Sir: I have the honor to transmit herewith the manuscript of an article on Wells and Subsoil Water prepared by Dr. W J McGee, of this Bureau, and recommend that it be published as Bulletin No. 92, of the Bureau of Soils.

Very respectfully,

Milton Whitney,
Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

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WELLS AND SUBSOIL WATER.

THE SUBSOIL WATER.

The habitability of any continent depends on its water supply—no water, no plants; no plants, no people.

The productivity of any land depends not merely on a sufficient water supply, but on its fitting distribution in space and especially in time. Without equable distribution in space some sections may be drowned and others desiccated; and since the natural distribution in time is not equable nature has developed a conserving and distributing agency for the variable water supply in the form of an absorbent soil and subsoil in which the supply may lodge until needed for vital growth; and the adequacy of distribution in time is measured by the sufficiency of this agency.

The natural water supply of a country is derived primarily from precipitation, chiefly as rain, partly as snow, and in small measure as dew. The water so derived passes largely into the soil (including duff) and on into the subsoil, and sometimes into rocks beneath. Here it remains for a time depending chiefly on the porosity of soil and subsoil and the slope of the surface, and is available for plant growth; eventually much of it seeps into streams and so drains away toward the sea. In the natural balance between soil and plant cover and slope toward which nature works (outside the relatively small areas of bare rock in mountains) all the storm water falling on the surface of the land thus enters the earth and equalizes the water supply required for plant growth and for maintaining animal life.

The natural water supply of a country marks a stage in a general circulatory system. Initially it is evaporated, chiefly from the oceans; in the form of vapor it is wafted by winds over the lands; in the course of hours or days a large part of this vapor is condensed and precipitated as rain or snow or dew; entering the ground, much of the water lodges for a time until absorbed by growing plants or drained into streams (surface or subterranean), and after gathering into streams the greater part of it soon returns to its ultimate reservoir, the sea, in which the circulation began with the original evaporation. This natural cycle is none the less real because (1) some vapor

remains indefinitely in the air; because (2) some evaporation occurs over the land, especially through transpiration from growing plants; and because (3) some of the water passes into chemical combinations instead of returning to the sea. It is the general circulation by which the continents are naturally supplied with water and thus rendered productive and habitable.

So far as the fruitfulness of the land is concerned, the essential stage in the natural circulation of water is that of the temporary lodgment in the soil and subsoil and adjacent rocks, for it is during this stage that the water is available for the needs of plant and animal life. Throughout mainland United States the mean annual quantity of water reaching the surface through precipitation is about 30 inches, forming an aggregate volume of some 5,000,000,000 acre-feet;[1] this quantity is about half that required for maintaining full productivity from average soils, so that over half the country is underwatered, much of it so far as to be practically uninhabitable. Even in the better-watered sections the rainfall during the growing season seldom suffices for the production of a full crop, so that generally the productivity of this country is essentially dependent on the water stored in soil and subsoil and underlying rocks within reach of draft by the growing plants. Moreover this store is the chief source of springs and streams whence animals drink; it is the supply for wells whence men take the water required for domestic use; and it is the reservoir which holds storm waters and equalizes the flow of brooks and rivers. The seasonal rainfall may be likened to a currency forming the basis of agricultural operations, while the store of water accumulated within the earth is as a reserve capital on which the permanent success of agriculture depends.

Generally the water temporarily lodging in soil and subsoil and underlying rocks is known as "ground-water"; but, although the distinctions are somewhat arbitrary, it is desirable to classify ground water as (1) *soil fluid*, or water containing organic and inorganic matters in solution and immediately available in soil-plant circulation; (2) *subsoil water*, which is ordinarily approximately pure and tends to pass either into the soil above through capillary movement or into streams or underlying rocks through seepage; and (3) *rock water*, which usually carries lime or other minerals in solution, circulates slowly, appears occasionally in deep wells or deep-seated springs, and probably passes largely into the sea through subterranean seepage.

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[1] Convenient equivalents involved in the use of customary units for the measurement of water are:
1 gallon=230.972 cubic inches=0.1336 cubic foot=8.34 pounds.
1 pound=27.68 cubic inches=0.12 gallon.
1 ton=2,000 pounds=32.04 cubic feet=239.68 gallons.
1 cubic foot=62.42 pounds=7.485 gallons.
1 acre-foot=43,560 cubic feet=1,359.6 tons=326,047 gallons.

The soil fluid is supplied in part directly by precipitation (especially in light rains), in part indirectly through capillarity from the subsoil store. The subsoil water is maintained through that part of the precipitation passing through the soil, especially during non-growing seasons, or in heavy rains; and the soil fluid and subsoil-water generally are freely interchangeable. The rock water is maintained from the subsoil store, merely comprising that portion passing to greater depths and remaining longer in the interstices of the rocks because of the greater depth or slower movement, and it is measurably interchangeable with the subsoil water.

The subsoil lying between the organic top soil and the inorganic rocks below is the chief medium for the storage of water available for plant growth and for the supply of streams and wells. This subsoil is widely variable in thickness, ranging from a few inches to many yards in exceptional cases, and averaging some 25 feet or more throughout the greater part of agricultural United States; it is variable also in origin and composition, ranging from residuary clays and loams produced by rock decomposition through alluvial silts and sands to till and aqueo-glacial materials laid down largely by ice action. Essentially it is an aggregation of solid particles of little coherence separated by interstices (or voids) varying in dimensions and form with the solid particles; and these interstices may contain water or air or both. The interstitial volume varies with the form and size of the particles; generally it averages some 35 to 40 per cent of the volume of the subsoil mass. Now, any water in the subsoil tends strongly under one of its fundamental properties to spread over the surfaces of the constituent particles or grains in uniform films, leaving the central portions of the interstices vacant or occupied only by air. This tendency is doubtless the dominant one in controlling the movement of water in soil and subsoil and rocks; and the "film pressure" or "surface tension" in which the tendency is manifested is an important factor in maintaining the texture and other properties of the subsoil mass and determining its agricultural capabilities in connection with the overlying soil. In connection with this film-forming tendency, the water in the subsoil (and in soil and rocks as well) moves by capillarity in such manner as to maintain an equilibrium of moisture throughout the mass; and through the capillary movement the water within the ground passes readily between soil and subsoil and rock, according to any draft that may be made upon it—especially that of absorption through rootlets into that soil-plant circulation by which vegetal growth is maintained. At the same time the interstitial water, like that in open receptacles, is subject to gravity, and, other things equal, tends to move downward vertically or obliquely along the paths of least resistance. The combined tendencies regulate the quantity

and control the movement of water in the ground. When the quantity is so large as completely to fill the interstices and the way is open for movement a part of the water readily drains away by seepage into open channels or to lower levels until the forces of film pressure and capillarity become paramount, when the drainage practically ceases and the remaining water is retained to play its rôle in (1) sustaining plant growth, (2) disintegrating grains or flocculating finer particles, and (3) generally reducing subsoil material to soil proper.

Conformably to the principles governing its movement, the water temporarily lodged in the ground generally increases downward from the surface to a depth at which it will exude or flow into any natural or artificial opening—a stream bed, a well, a drainage ditch, or any deep excavation. The level at which the water so exudes is commonly known at any point as the "water table." Viewed broadly, the levels at which water will exude from soil or subsoil or rock form a surface comparable with the natural surface of the country, i. e., the surface formed chiefly by the land in its endlessly varied aspects of hill and dale, upland and lowland, undulating plain and smooth valley, yet comprising also the water surfaces in lake and pond and stream. Now the surface at which water exudes generally lies below, but is measurably comparable to this natural surface of the country; it forms what is conveniently known as the *ground level of water;*[1] it is a somewhat flattened and softened counterpart of the surface of the country, commonly lying some yards below it, but coinciding with it in lake and pond and generally in swamp and stream. Like the water table, at any point the ground level of water is more or less variable in its relation to the surface of the country; it rises during prolonged rains or series of wet seasons; it lowers during droughts; commonly it lowers under the changes attending settlement and extensive cultivation; it rises in irrigated valleys; it can be raised by intensive culture and such provision for vegetal cover as will prevent surface run-off of storm waters; yet, howsoever variable, it measures the proximity of the subsoil water to the surface, and its availability for eking out through capillary movement toward the surface a rainfall insufficient for crop production during the growing season.

Broadly, the ground level of water forms the upper surface of the reservoir or store of subsoil water forming the agricultural reserve capital of the country; and its availability in crop production varies with its depth beneath the surface of the land. Useful experiments on capillary movement have been made, yet too little is known as to the distance through which the movement operates or the rate at

[1] Defined in "Soil Erosion," Bureau of Soils Bulletin 71, 1911, p. 27.

which it proceeds. In a general way it may be said that capillarity operates more freely though for a less distance through coarse materials, less freely but for a greater distance through fine materials. Pending specific determinations, it may be assumed (on the basis of such experiments as have already been made) that in average subsoil materials moisture will move under capillarity with sufficient freedom to affect the growth of a crop from a depth of 3 or 4 feet; that it will move during the course of a year from a depth of say 10 feet; and that under favorable conditions of subsoil texture it will move during a term of years and progressively equalize the distribution of the subsoil water through a depth of 30 or 35 feet. The level at which the subsoil water becomes available for capillary movement probably averages some feet above the point at which the quantity is sufficient to permit seepage into a channel or delivery into a well or other excavation, i. e., what may be called the agricultural water table averages some feet higher than the well water table; but the difference, which is probably constant for each type of subsoil, can be fixed only by local observation.

Despite the interest attaching to subsoil water as a phase in the natural circulation by which the continent is rendered habitable, and despite the importance of the natural reserve capital on which successful agriculture depends, little thought has thus far been given to its quantity, its rate of movement, and the time it remains in the ground, or its rôle in regulating the absorption of storm water and the flow of streams and rivers. The rainfall over most of mainland United States has been measured, many of the streams have been gauged, and some progress has been made in determining evaporation; yet the accumulated water within the ground has been practically neglected, and little systematic effort has been made to ascertain its volume, its distribution, or its relations. The volume must be vast. On certain reasonable assumptions the quantity within the first hundred feet from the ground surface in mainland United States has been estimated as sufficient to form a reservoir conterminous with the country some 17 feet deep, i. e., an amount equivalent to 6 or 7 years' rainfall or some 20 years' discharge of all the rivers of the country. Its distribution is of no less consequence; for it is not only the natural safeguard against drought in field and pasture, but is the evident source of brooks and rivers with all their multifarious uses. Significant as are the broader relations, none are of more consequence than the immediately practical one of the local depth of the ground level of water beneath the land surface in each section of the country—for this is the local measure of permanent productivity and habitability.

INDICATORS OF SUBSOIL WATER.

Commonly the surest indicator of the level of subsoil moisture is the water in an outletless pond or lake, which rises during wet seasons and lowers during dry; the exposed water being merely the extension of that permeating the adjacent subsoil. Nearly as trustworthy are the indications afforded by the moisture level in swamps and marshes, which are flooded during rains or thaws and desiccated sometimes to considerable depths during droughts. Useful indications are afforded also by streams, notably those of the Plains region, whose channels are trenched to the moisture level or level of saturation, so that their flow is visibly increased by seepage from the ground into their channels during low water and visibly depleted by seepage into the ground during high water—indeed, the water of all normal streams is thus interchangeable with that of the adjacent subsoil or rocks, though the interchange is not always manifest. These natural indicators are nevertheless limited in applicability, chiefly because of their local occurrence and the difficulty of extending their indications over intervening higher lands.

When available, sure indicators of the subsoil water level are afforded by artificial excavations for industrial purposes, such as foundations, railway and canal cuttings, irrigation and drainage ditches, etc.; but their value is limited by restricted distribution, frequently by temporary duration, and sometimes by the fact that they modify materially the movement and hence the level of the subsoil water. Of all artificial excavations, the most useful indicator of the local water table is the ordinary well, which is commonly of measured depth and usually so located as to represent a typical or average relation between a considerable surface area and the more or less variable level of water in the ground beneath; while in settled districts the wells are more or less uniformly distributed over the entire surface of the country, thereby serving to fix the saturation level at a large number of approximately equidistant points.

Despite the widespread notion that well water can be found only in particular spots, or along certain lines located only by chance or through mystic means, it can not be too clearly understood that throughout far the greater part of the country the subsoil and subjacent rocks are saturated to within a moderate depth below the land surface; and that the success of the well digger depends primarily on going down to this level of saturation, and, secondarily, on reaching materials of such texture that the water will exude or flow in the excavation more freely than it is removed by evaporation or use. In fine materials of close texture the water of saturation is usually abundant, but often moves too slowly for free delivery into the basin (though since the rate of delivery increases with the surface exposed, a large well is more likely to have an ample supply than a smaller one); so

that generally it is necessary to continue the excavation until a layer of coarser texture—itself fed by the more sluggishly moving water in the fine materials—is encountered; here the saturating water passing gradually from the fine to the coarser materials is by the latter delivered freely into the basin of the well. This relation is frequently recognized by well diggers and others, who commonly recognize the water-bearing strata as "veins," but often fail to realize that the so-called "vein" merely measures the level of free delivery rather than that of saturation, a level generally marked by the height to which the water rises in the well. Even where the subsoil is thin, or where for other reasons the well must be extended into rock, the relations are essentially the same; nearly all rocks (except in some mountainous or arid regions) are saturated at a certain depth beneath the surface, though the water often fails to flow with sufficient freedom to supply a well until a sandy or vesicular stratum or an irregular parting is penetrated.

Among wells the surest indicators of the ground level of water are ordinary dug wells of 4 to 6 feet in diameter, permanently walled with stone or brick; dug wells cribbed or curbed with wood are about as trustworthy, though less durable. Bored wells (i. e., those put down by means of large augers in unconsolidated deposits) are less satisfactory indicators of the water table, chiefly in that their smaller diameter gives less opportunity for free delivery of water into their basins, for, other things equal, it is necessary for them to penetrate either coarser materials or a greater depth of finer in order to receive an adequate supply; moreover (except when they are curbed with tiling or other expensive material), they are generally cheaper than dug wells, more frequently put down for temporary use only, and proportionately less serviceable as indicators of what may be considered the more permanent level of saturation. Driven wells (i. e., metal pipes, provided with sand screens, forced into the ground by impact or pressure) are still less satisfactory, indeed they are practicable only under exceptionally favorable conditions for circulation of the subsoil water, as in thick sand beds overlain by finer material. Drilled wells in unconsolidated materials are less reliable indicators of the water table than open wells, chiefly in that the small diameter prevents adequate delivery, save from exceptionally coarse or porous strata; when they penetrate rock (as is usually the case) the same principle holds; yet partly because they are usually put down where dug wells have failed, partly because the water within them tends to rise to the saturation level, they are serviceable indicators of the ground level of water.

While artesian wells are commonly considered to form a class by themselves, their significance as indicators of the level of saturation is not greatly different from that of drilled wells generally—indeed

recent research indicates that the distinction between artesian and other wells is often overdrawn. The artesian well was so designated originally from the Province of Artois in France, in which deep drillings yielded water rising to a considerable height above the surface. There the geologic strata lie in the form of a basin, known among geologists as "the Paris Basin," and there as elsewhere the conditions recognized as requisite for artesian flow are (1) an elevated catchment area, (2) one or more inclined pervious strata, and (3) one or more confining strata, sometimes described as "impervious." Now, strictly speaking, there are no "impervious" strata in nature; practically all rocks (even dense granites and solid marbles) are sufficiently porous or vesicular to absorb some water and permit its passage at some rate, however slow; while in most cases the confining strata effective in determining artesian flow are pervious only in less degree than the exceptionally porous beds they cover. Thus throughout any artesian basin there is more or less loss (or leakage) of water upward through the confining strata under the hydrostatic head determining the flow from the artesian aperture; indeed practically the effective head of the artesian well is controlled rather by this upward leakage than by the difference in altitude between the catchment area and the artesian basin. Doubtless in some cases the confined water under enormous hydrostatic head becomes an effective geologic agency, perhaps disrupting strata and escaping upward from great depths, as in Ocklawaha and other springs in Florida, and probably dissolving some minerals with exceptional energy; but so far as the ground level of water is concerned the chief effect of the upward leakage is to combine with the water supplied by local rainfall, and in proportion to its volume to raise the level of saturation,—this even where the rate of leakage is so slow that the water table may lie yards beneath the surface, while a deep drilling into porous strata will permit the confined water to rise some feet above the surface. Broadly, the relations are identical with those commonly brought out in ordinary wells; save in exceptional cases water in the ordinary dug well rises from 1 to 5 or more feet within a few days after the excavation is made, and in the average drilled well water rises to something like half the depth of the drilling, often indeed approaching the surface. Even from the well maker's point of view the class of artesian wells is not easily maintained; with the multiplication of deep drillings in the Paris Basin the water which at first flowed at a considerable height above the surface has been drawn down so far that most or all of the wells now require pumping, and the experience in most other artesian basins has been similar. Accordingly, there is a disposition of late to apply the term "artesian" to all drilled wells in which the water rises to a considerable height, and to designate as "flowing" those in which the water flows at or above the

surface. Incidentally it may be noted that the flowing well can seldom if ever be regarded as permanent—indeed in the broad and long view required in dealing with natural processes and resources, flowing wells are but passing features attending what may be considered the pioneer stage in industrial development.

In many wells the water level varies with the season, much as do the levels of open ponds and streams; and this variability qualifies their use (without diminishing their value) as indicators of the upper surface of the great reservoir of water within the ground. When observed at all, the range in depth from season to season is ordinarily much greater than that of the rainfall; e. g., the range in depth of water in the well may exceed 5 feet, while the difference in rainfall between the 6-month seasons may be less than 1 foot. Commonly this difference means merely that the variable well is so located as to be affected by subterranean drainage from or to adjacent areas; on the ground it may be so interpreted as to indicate something of the lateral movement of the subsoil water, while in the broad way it merely indicates the substantial unity of the subsoil water volume as a whole for each district or section of the country.

Sometimes springs mark the ground level of water no less accurately than wells, streams, and ponds; "wet weather springs," like variable wells, indicate the seasonal range of the water table; while uniform springs generally indicate a well-established balance between cover and soil and slope throughout the region in which they occur. Most of the innumerable springs found by settlers in the United States were in woodlands; and most of them continued to flow so long as the forest cover remained, but gradually failed as the surface was cleared and passed under cultivation, so that to-day it is only the exception rather than the rule as of yore to find rural homesteads supplied by springs. Mineral springs and springs of hard water welling from crevices usually indicate an upward movement of rock water (rather than subsoil water) analogous to the upward leakage of water in artesian basins; though even such springs are maintained indirectly by the reservoir accumulated chiefly within the subsoil overlying the rocks, of which they serve as approximate indicators.

Briefly, whatever the significance of ponds and streams and miscellaneous excavations as indicators of the ground level of water, the most practicable means of measuring its relation to the surface throughout the country at large is afforded by wells; and whatever the variety in wells, any census of them, however incomplete, can hardly be without use in connection with agricultural production and rural living as related to the subsoil water forming the agricultural reserve capital of the country.

THE WELL CENSUS.

INCEPTION OF THE INQUIRY.

Although already in contemplation, the task of collecting the records of wells throughout the country grew out of field work in conjunction with a soil-survey party in the western part of Washington State during the autumn of 1909. Field observations there indicated that the local ground level of water is largely independent of the general configuration of the land, and is controlled by the stream-water level in deep-cut gorges generally heading in the Cascade Mountains and opening directly into arms of the Pacific—arms occupying the lower portions of the gorges and themselves finally dominating both streams and the subsoil water immediately controlled by them. Prof. Henry Landes, State geologist, who was cooperating in the work, concurred in the inferences from the observations, and at once undertook to collect records of wells with the view of constructing a hydrologic map showing the relation of the saturation level to the surface. Before the end of 1909 records of a good many wells were secured, but were found inadequate as a basis for a useful map, and they were kindly turned over by Prof. Landes to the Bureau of Soils for use in a more general investigation.[1]

During the winter of 1909–10 consideration was given to various possible means of obtaining trustworthy information relating to the wells of the country without the employment of special agents and the organization of a corps, for which means were not available; and with the courteous acquiescence of Mr. Victor H. Olmsted, Chief of the Bureau of Statistics of the Department of Agriculture, it was finally decided to invoke the cooperation of his corps of township crop reporters. This corps is a notable one. Made up of one or more residents in each township, each locally reputed for intelligence, probity, and sound judgment, the corps ranks high among the practical adjuncts of the department and is among the more useful agencies for coordinating the departmental work with the public welfare. Most of the reporters living in rural communities, it was felt that a considerable fraction of them would be so informed concerning their own wells or others in their neighborhood as to furnish data about as definite as could be obtained by inquiry on the ground.

In July, 1910, a "well circular" was prepared, comprising a brief general statement and a blank schedule arranged for the insertion of data relating to wells. The schedule was carefully designed with the view to (1) eliciting specific information, and (2) discouraging indefinite or ill-considered response. While direct and fairly simple it was so arranged that neither an indifferent or impatient man, nor

[1] Of these well records, 12 for Island County, 10 for King, 34 for Pierce, 27 for Skagit, 82 for Snohomish, and 50 for Whatcom (215 in all) are incorporated in the data relating to Washington State in the following pages.

one lacking both specific information and general intelligence would be likely to fill the blanks to his own satisfaction. Special provision was made for recording the dates at which wells were put down and for recording change in the water level; and in the body of the circular a guarded expression directed attention to the desirability of noting any such change.

A copy of the circular with the blanks typically filled is reproduced below. The information furnished by the reporter appears in italics.

[Department of Agriculture, Bureau of Soils, Office of Soil-Water Investigations.]

WELL CIRCULAR.

WASHINGTON, D. C., *August 1, 1910.*

Throughout most of the country water for domestic supply is obtained from wells. Commonly the level of water in wells marks the water-table, or ground-water level, in their neighborhood. In some cases settlement and cultivation have been followed by changes in the water level; these changes are best shown by variation in the depth of standing water in wells.

The question of water supply is vital to farm and community life, and it is deemed important to ascertain and tabulate the present depth of ground-water as indicated by wells, together with any changes observed, in all sections of the country.

This circular is sent to a large number of correspondents of the Department of Agriculture. You would confer a favor by filling blanks in the appended form so far as your knowledge will permit. If your knowledge extends to more than three wells, additional blanks will be sent you on request; and if you know of cases in which springs have started or failed, or in which wells have been abandoned because of failure of supply, you will oblige by stating the facts. A prompt reply will be appreciated.

Approved: W J McGEE,
MILTON WHITNEY, *In Charge.*
Chief of Bureau.

Location of wells: *

1. Township, *24.* Range, *31.* Section, *35.* Quarter Section, *S. W.* Part of Q. S., *E.* ½.
Distance, ½ mile. Direction, *West* from *Cartmell.* County of *Newton.*

2. Township, *24.* Range, *31.* Section, *36.* Quarter Section, *N. E.* Part of Q. S., *S. W.* ¼.
Distance, ½ mile. Direction, *East* from *Cartmell.* County of *Newton.*

3. Township, *24.* Range, *31.* Section, *24.* Quarter Section, *N. W.* Part of Q. S., *E.* ½.
Distance, *3* miles. Direction, *N. W.* from *Cartmell.* County of *Newton.*

Character of wells (dug, drilled, driven, etc.): 1. *Dug.* 2. *Dug.* 3. *Drilled.*
Dates of making wells: 1. *1889.* 2. *1887.* 3. *1899.*
Depth of wells: 1. *30* feet. 2. *27* feet. 3. *100* feet.
Original depth of water in wells: 1. *2* feet. 2. *3* feet. 3. *30* feet.
Present depth of water in wells: 1. *2* feet. 2. *2½* feet. 3. *30* feet.
Owners of wells: 1. *C. W. McKinley.* 2. *John Hill.* 3. *S. Wolfe.*

(Signature) *Ed McKinley.*

Residence: Post Office, *Cartmell.* County, *Newton.* State, *Missouri.*
Date, *September 10, 1910.*

Remarks:.....

* By Township, Range, etc., in Land Survey States; elsewhere by distance and direction from nearest town.

In September the circulars were kindly mailed by Mr. Olmsted to his crop reporters. Returns began to arrive by the next mail, though most of the circulars were held a week or more for consideration or for opportunity of obtaining or verifying data—indeed, they continued to arrive in decreasing numbers for months, the latest appearing in January, 1912. Of the 33,000 reporters, something less than half replied; of the replies, several hundred either expressed or implied dearth of information or lack of interest, while a gratifyingly small number slighted the inquiry; several hundred other replies were either indifferent or expressed in general rather than specific terms; but about a third of the reporters (a larger number than anticipated) sent in more or less carefully filled schedules, each covering from one to three or more wells, the great majority in such form as to inspire a high degree of confidence in the trustworthiness of the information.

At the outset it was designed to follow up the initial distribution of the circulars with other sendings, and the circular contained an intimation to that effect; but as the replies came in and received preliminary examination, it became evident that compliance with the request of some thousands of the reporters for additional blanks would result in the concentration of data in particular localities, with corresponding inequability in distribution of the returns brought in by the single sending. Accordingly, save in a few sporadic cases within a few weeks of the preliminary issue, no additional blanks were sent out; so that the data represent, as it were, a single sweep of the net.

Many of the specific schedules were accompanied by instructive remarks, frequently indicating that the reporters had themselves made or supervised the making of their wells and had observed the stage of water and state of the well for periods often exceeding a quarter and even a half century (in one case reaching 86 years). In many instances the remarks also throw light on the relations between wells and conditions attending settlement, the relations of rainfall and other water conditions, and in some cases on the relations between wells and atmospheric conditions. Collectively, the schedules form a rich repository of information concerning the wells of the country during several decades ending in 1910.

REDUCTION OF THE DATA.

The schedules were first alphabetically arranged by States and counties and generally by stations (usually post offices), and each was examined critically, first with a view to inherent evidence of trustworthiness (including such definiteness of location as to permit identification on the ground within a reasonable interval), then with respect to available general or special information as to the geology and physiography of its surroundings; and finally with reference to

the records of other wells within the same and neighboring counties. Under this scrutiny the indefinite and doubtful responses, to the number of some 10 per cent of the more or less completely filled schedules, were discarded in the tabulation, though a good many of them were kept in the files.

For convenience in assembling, the data contained in the accepted schedules were transferred to "county sheets"; the amounts of any changes in water level and the depth of the water table being at the same time computed and incorporated. The number of reporters from, and the number of wells in the county were also noted, while the more instructive "remarks" were entered as footnotes. A fairly typical "county sheet," selected as representing on the whole the best reported county and one not far from the geographic center of the country (Newton County, Mo.) is reproduced on pages 19 and 20, and a "well circular," as filled by the reporter from the first alphabetic station in that county, is reproduced on page 17; these illustrate the data sent in by the reporters and used in the final tabulations.

In scrutinizing the schedules and preparing the county sheets the wells were divided into two classes, designated respectively as *a* and *b*. While in the great majority of cases these classes were taken directly from the schedules in which they were respectively designated as "dug wells" and "drilled wells," the former class generally includes also (1) bored wells, (2) driven wells, and (3) drilled wells of moderate depth in which the water level corresponds fairly with that in neighboring dug wells; while in a few cases (chiefly in the Plains) deep dug wells deriving their supply from the same horizon as neighboring drilled wells were put in the *b* class. The "moderate depth" forming the criterion for assigning drilled wells to one class or the other varies from section to section, chiefly according to the prevailing depth of dug wells; commonly it was 50 or 55 feet; in upland Georgia it was 60 feet; in Indiana it was 45 feet. The aim of the classification was not so much a uniform and simple distinction as a separation of the wells according to their trustworthiness as indicators of the subsoil water level.

Missouri—Newton County.

Place.	Date.	Well depth.	Original water.	Present water.	Change.		Water table.
					Rise.	Fall.	
(14 reporters).							
Cartmell	1887 *a*	27	3	2.5	.....	0.5	24.5
	1889 *a*	30	2	2	.....	.....	28
	1899 *b*	100	30	30	.....	.....	70
Neosho [1]	1867 *a*	30	8	8	.....	.....	22
	1880 *a*	26	3	3	.....	.....	23
	1884 *a*	20	4	4	.....	.....	16
Do	1875 *a*	35	4	4	.....	.....	31
	1900 *a*	25	3	3	.....	.....	22
	1906 *b*	60	15	15	.....	.....	45
	.....	160	.....	80	.....	.....	80

Missouri—Newton County—Continued.

Place.	Date.	Well depth.	Original water.	Present water.	Change.		Water table.
					Rise.	Fall.	
Ritchey	1867 *a*	75	12	12			63
	1874 *a*	82	25	25			57
	1906 *b*	80	53	53			27
	a	20		11			9
		150		75			75
Do	1850 *a*	40	10	10			30
	1870 *a*	30	4	4			26
	1897 *b*	71	21	21			50
Sarcoxie (near)	*a*	50	20	10		10	40
		150	90	85		5	65
		171	120	130	10		41
Seneca [2]	1870 *a*	20	20	6		14	14
	1891 *a*	30	5	5			25
	1891 *a*	30	5	5			25
	1897 *a*	32	5				27
Do.[2]	1873 *a*	41	1.5	1.5			39.5
Do	1880✓ *a*	25	3				22
	1885✓ *a*	35		5✓			30
	1890 *a*	45	3	1.5		1.5	43.5
	1907 *a*	19	4	3.5		0.5	15.5
Springcity	1853 *a*	3✓	3	0		3	3
	1874 *a*	65	6	6			59
	1909 *b*	169	100	100			69
Spurgeon	1886 *a*	42	10	8		2	34
	1900 *a*	40	10	7		3	33
	1908 *b*	150	80	70		10	80
	1866 *a*	80		15✓			65
Stella	1875 *a*	80	4	4			76
	1881 *a*	85	25	25			60
	1895 *a*	15	5	5			10
Do	1896 *a*	40	1.5	1		0.5	39
	a	35	2	1		1	34
	a	25	1.5	0.5		1	24.5
Wentworth [4]	1848 *a*	35	2.5	2.5			32.5
	1872 *a*	40	10	10			30
	1887 *b*	160	80	80			80
Sum (46 wells)	58,273 *a*	1,352	225	211	0	37	1,133
	13,312 *b*	1,421	589	739	10	15	682
Average	1880 *a*	38.6	7	6.4			32.4
	1902 *b*	129.2	65.4	67.2			62

[1] "In the last 10 years a few of the springs have failed considerably."
[2] "Springs are not as strong as they were 25 years ago."
[3] "Two springs * * * have gone completely dry."
[4] "I often draw little fish and crabs out of my well; they are white, and will not live long in still water."

NOTE.—Unusual or arbitrary figures indicated by check marks.

When records otherwise acceptable were found deficient in a minor particular (e. g., the "present water" of a well in which only the depth was recorded, the "original water" of a well dry at the time of reporting, etc.), and when either personal knowledge or clear inference from data for neighboring wells seemed to warrant, the defect was remedied by estimate in filling out the county sheet—such estimates being indicated by convenient marks. In certain cases dates were introduced in like manner, usually as the mean between limiting estimates on the part of a recorder whose information was only approximate, such figures being similarly marked. On general examination it would appear that the aggregate number of estimated figures (in which the probable error could hardly exceed 2 or 3 per cent) is less than 1 per cent of the columns in which they occur. In rare instances (aggregating a fraction of 1 per cent of the records) obvious errors in

the schedules—usually the confusion of "depth of water in wells" with depth *to* water—were corrected on the schedules, and the corrected figures were introduced in the county sheets; but in case of doubt, as in the case of omissions in filling the blanks, the corresponding places in the county sheets were left blank. Naturally the most frequent omissions in the schedules are of dates, and next to these the original stages of water; records were not rejected solely because of absence of dates; and a few records of well depths were retained as presumably typical for their neighborhood, even when the depth of water was omitted, so that the level of the water table was not fixed. As the county sheets were completed, the columns were added and the means computed and used in verification of the figures.

After the county sheets for a State were completed the data were transferred to a tabular "summary" for the State, giving the sums and means for each class of wells in each county. As the preparation of these summaries advanced it became evident that the change of water levels in wells is a noteworthy feature in the well history of the country; at the outset the wells of unchanged water level and those in which the water had risen and fallen were entered in the summaries; but it was soon found more convenient to distinguish all wells in which both the original and present stages of water were recorded as "bi-state wells," leaving those of unchanged water level as the remainder after deducting those in which the water has either risen or fallen. In some of the earlier tabulations the dates for the bi-state wells were separated with the view of fixing with the highest practicable accuracy the mean period covered by the change; but it soon appeared that no considerable or systematic difference occurs between the mean dates for wells of changed water level, those of unchanged water, and those recording only a single water level, so the distinction was abandoned. As the records were reviewed in tabulating the summaries, some of those incorporated in the county sheets were canceled (chiefly when so aberrant as to seem misleading); and in some cases records at first rejected on the preliminary examination were restored in county sheets and summaries.

As the tabulation of data for the respective States advanced, the confidence in the trustworthiness of the schedules inspired by the first examination was enhanced. It soon became clear that despite the considerable variety in depth of wells, etc., the records for each natural physiographic region, whether included in a single State or including parts of several, are strikingly harmonious, indicating a depth and distribution of ground water conforming to the physiography, structure, and climate of the region. Especially significant are the relations brought out by the records of change in water level; for not only is there an agreeable consistency between the ratio of

wells changed and the average amount and direction of change in each county and State, but the figures for each physiographic region are so concordant throughout as to suggest its general unity. At the outset of the reduction some effort was made to work out the "probable error," or a correction for "personal equation" on the part of reporters, e. g., in terms of the degree of accuracy that might be expected in a record made by an expert on the ground after full inquiry from the well owner; but as the tabulation proceeded it became increasingly evident that any such systematic error is negligible, and that the data submitted by the great majority of the reporters are about as trustworthy as it would be possible to obtain from the same wells even with unlimited expert aid. Of course the inherent evidence of accuracy in different schedules is not equally convincing, some indeed lying near the line of rejection; yet far the greater part are sustained not only by their own inherent evidence but by the corroboration of equally convincing records from the same or neighboring counties and States.

It may be noted that while any error measurably vitiates sums and averages, and while a good many records were rejected simply because so aberrant as to suggest error not otherwise indicated, the occasional errors which doubtless eluded detection are so completely absorbed in the mass of trustworthy data as to have little effect on the final figures—the individual aberration is lost in the multitude. Even when wells in a particular section depart strikingly from the mean, the effect on the averages is limited. Thus in extreme northeastern Iowa the geologic structure and other conditions are such that during recent years it has been necessary to drill nearly all wells to depths ranging from 100 to 500 feet; yet when the 56 wells recorded for Allamakee, Clayton, and Winneshiek Counties are deducted from the aggregate mean well depth for the State, it is reduced only from 84.4 to 80.3 feet, and the mean water table from 46.1 to 42.5 feet. So also the single deep drilled well with its water table at 135 feet among the 72 shallow wells of lowland Missouri merely lowers the mean water table from 19 to 20.6 feet; and the recorded lowering of the water table in seven drilled wells in Bexar County, Tex., to the enormous aggregate of 702 feet changes the mean lowering per decade for the wells of the State less than half a foot.

While the number of wells reported is far too limited to warrant the construction of a hydrologic map showing the relations of the ground level of water to the surface, it is nevertheless too large to warrant present publication of the data for individual wells; and it is for this reason that the data are combined by counties. Nevertheless, it is recognized that the means for counties, and still more for States, may be misleading unless viewed in connection with the extremes; and in order to bring out both means and extremes, the "proportionate

depths" of the water table in each county and State were tabulated in connection with the State summaries. These show by numbers and percentages the depths arranged in five classes: A, shallow wells (less than 10 feet in depth); B, common wells (10 to 30 feet, inclusive); C, deep wells (over 30 to 60 feet); D, deeper wells (over 60 to 100 feet); and E, phreatic[1] wells (over 100 feet). It may be noted that while the ratio of the different depths varies from State to State, and although this tabulation includes all of the deep drilled wells indicating the local level of the water table, a trifle over 50 per cent of the entire number fix the ground level of water at 30 feet or less below the surface.

As the advancing tabulation revealed the consistency in data for areas of related configuration, structure, and climate, it was found desirable and practicable to define certain regions on the basis of the well records. These regions are (1) New England; (2) Eastern coast plain, extending from Long Island to South Carolina; (3) Appalachian, extending from New York to upland Georgia and northeastern Alabama; (4) Southern coast plain, from Georgia to Louisiana, extending up the Mississippi to include western Tennessee and Kentucky and lowland Missouri; (5) Interior, comprising Illinois, Indiana, Iowa, the bluegrass region of Kentucky, with middle Tennessee and northwestern Alabama, Michigan, Minnesota, Ohio, and Wisconsin; (6) Ozarkian, including upland Missouri and northwestern Arkansas; (7) Plains, comprising the median States from North Dakota to Texas, with Plains Colorado; and (8) Cordilleran, extending from the Rocky Mountain States to the Pacific. Where the boundaries of these natural regions traverse States the State summaries (including the tables for proportionate depths of wells) were divided to permit recapitulation both by States and by well regions. In two cases (Michigan and Mississippi) the data for States lying wholly within a region were divided in conformity with natural and historical relations brought out in the tabulation.

As the State summaries were completed, the aggregates and means were computed, and the figures so obtained were used in "recapitulations" by States and by well regions. In the original State summaries all aggregates were carried throughout for use in computing the means; but in the transfer of the figures to the final copy for the tables incorporated in later pages the aggregates were omitted. It may be noted that in reckoning dates the final date was averaged as the end of the year 1910, and in most of the recapitulations the

[1] A term applied usually to deep, nonartesian wells or wells deriving their supply from unknown sources; used somewhat more broadly for "underground waters which can be or which it is hoped may be reached by wells or other subground works" by the late Robert Hay in "Artesian and Underflow Investigation Between the Ninety-seventh Meridian and the Foothills of the Rocky Mountains." (Final Geological Reports of the Artesian and Underflow Investigation Between the Ninety-seventh Meridian of Longitude and the Foothills of the Rocky Mountains, to the Secretary of Agriculture. Fifty-second Congress, first session, Senate Ex. Doc. 41, 1892, part 3, p. 8). See also Bul. 93, Bur. Soils, U. S. Dept Agr.

mean dates were expressed in years and tenths.[1] In the State summaries the changes in water level are given only in terms of numbers of wells and of aggregate rise and fall of water; but in the recapitulations the change in water level is reduced to comparative terms: (1) The mean rise and fall per well; (2) the total number of wells changed and the mean actual change per well (commonly lowering, but indicated by – when in the other direction); (3) the mean change, reduced to the basis of all bi-state wells in the division or State for the period of observation, and (4) the same reduced to the decade unit. Neither in the summaries nor in the recapitulations were the mean depths of wells or of water in the wells reckoned for the two classes ("dug wells" and "drilled wells"), for the reason that the figures are not directly comparable and the averages would be misleading; but the water-table indications of the two classes were summed and averaged, since in respect to the relation of the ground level of water to the surface the figures are complementary. Of course the data for the "dug wells" (forming nearly three-quarters of the aggregate number) are far the more trustworthy as indicators of the water table, but the figures for the "drilled wells" derive value largely from the fact that they commonly occur where ordinary wells have failed or have not been put down. In general the recapitulation by States (particularly in its aggregates and means) is too broadly generalized to be of high indicatorial value, and is useful chiefly as affording a comparative view and a means of checking the local data; the most useful figures as indicating the ground level of water and its changes in each locality are those for the counties brought together in the State summaries; next in value are the aggregates and averages brought out for several regions in the recapitulation by regions.

DISTRIBUTION OF THE DATA.

In the accompanying table (p. 25) the distribution of the 28,906 wells finally incorporated for the 48 States of the country is shown in detail. The data for these wells were recorded by 10,559 reporters, averaging a little over 2.7 wells per reporter. Of the 48 States, 7 report less than 50 and 9 over 1,000 wells, the range being from 20 in Rhode Island and 25 in New Hampshire up to 1,527 each in Iowa and Missouri. The records are from 2,617 counties, or 90 per cent of the total number in mainland United States; the ratio of counties reporting ranging from 100 per cent in Delaware, Idaho, Iowa, New Jersey, and Wisconsin down to about 40 per cent in Mon-

[1] A preliminary recapitulation was prepared before the final tabulations were completed, for publication in the Yearbook of the Department of Agriculture for 1911 under the title "Subsoil water of central United States;" and the principal table therein was incorporated in an article on "Principles of water-power development" in Science, Vol. XXXIV, 1911, pp. 813–825. The minor discrepancies between the mean lowering per decade in this table and the corresponding figures herein are due mainly to the use of fractional years in the final computation; in Minnesota the wider discrepancies are due to the fact that the data for the State were resummarized and made to include a number of wells excluded from the primary tabulation.

tana and Rhode Island, the most striking shortages being 70 counties in Texas and 22 in Georgia. The mean number of wells reported on per county ranges from 3.1 in New Hampshire and 3.6 in Montana to 28 in Delaware and 20.9 in North Dakota; the average for the country being 11.

The distribution of wells by counties and States whose boundaries are civil and in general fixed by natural features is of less significance as bearing on the relation of the ground level of water to the surface than the distribution by area; and this varies widely in different parts of the country. The number of square miles per well in different States ranges from 23.4 in Delaware, 32.4 in New Jersey, 32.8 in Ohio, and 36.4 in Iowa to over 3,000 in Montana and Nevada and over 500 in seven States (mostly Cordilleran, but including Maine); the average for the country is 102.9.

Distribution.

State.	Wells.	Reporters.	Counties.		Land area (square miles).	Square miles per well.	Dependability index.
			Number reporting.	Wells per county.			
Alabama	598	214	63	9.5	51,279	85.8	3
Arizona	44	16	8	5.5	113,840	2,587.3	0.2
Arkansas	997	348	74	13.5	52,525	52.7	3
California	491	179	46	10.7	156,092	317.9	0.8
Colorado	414	149	43	9.6	103,658	250.3	0.9
Connecticut	43	17	6	7.2	4,820	112.1	2
Delaware	84	28	3	28.0	1,965	23.4	5
Florida	345	120	41	8.4	54,861	159.0	3
Georgia	823	298	124	6.7	58,725	71.4	3
Idaho	311	122	23	13.5	83,779	269.4	0.9
Illinois	1,224	445	97	12.6	56,002	45.8	5
Indiana	939	312	88	10.7	35,885	38.2	5
Iowa	1,527	517	99	15.4	55,586	36.4	5
Kansas	1,317	456	103	12.8	81,774	62.1	4
Kentucky	805	314	109	7.4	40,181	49.9	4
Louisiana	408	146	48	8.5	45,409	111.3	3
Maine	51	22	10	5.1	29,895	586.2	0.9
Maryland	177	67	20	8.8	9,941	56.2	3
Massachusetts	62	22	8	7.7	8,039	129.7	2
Michigan	1,074	480	81	13.3	57,480	53.5	4
Minnesota	1,169	414	84	13.9	80,858	69.2	4
Mississippi	821	296	76	10.8	46,362	56.5	3
Missouri	1,527	551	111	13.8	68,727	45.0	4
Montana	40	15	11	3.6	145,776	3,644.4	0.1
Nebraska	1,239	442	91	13.6	76,808	62.0	4
Nevada	34	16	9	3.8	109,821	3,230.0	0.1
New Hampshire	25	12	8	3.1	9,031	361.2	1
New Jersey	232	87	21	11.0	7,514	32.4	4
New Mexico	217	78	23	9.4	122,503	564.5	0.6
New York	744	276	56	13.3	47,654	64.1	3
North Carolina	806	304	87	9.3	48,740	60.5	3
North Dakota	940	317	45	20.9	70,183	74.7	4
Ohio	1,243	446	87	14.3	40,740	32.8	4
Oklahoma	888	297	72	12.3	69,414	78.2	4
Oregon	255	101	31	8.2	95,607	374.9	0.8
Pennsylvania	561	201	63	9.0	44,832	79.9	3
Rhode Island	20	7	2	10.0	1,067	53.3	3
South Carolina	454	169	40	11.3	30,495	67.2	3
South Dakota	766	203	54	14.2	76,868	100.3	4
Tennessee	758	269	90	8.4	41,687	55.0	3
Texas	1,386	477	172	8.1	262,398	189.3	3
Utah	79	30	16	4.9	82,184	1,040.3	0.5
Vermont	49	23	9	5.4	9,124	186.2	2
Virginia	916	346	98	9.3	40,262	44.0	4
Washington	586	344	35	16.7	66,836	114.1	0.9
West Virginia	497	171	49	10.1	24,022	48.3	4
Wisconsin	779	277	70	11.1	55,256	70.9	4
Wyoming	141	58	13	10.8	97,594	692.2	0.7
Total	28,906	10,559	2,617	11.0	2,974,099	102.9	.....

DEPENDABILITY OF THE DATA.

Manifestly, whatever the trustworthiness of the individual records, the dependability of the 28,906 wells (including 28,797 showing the water table) as indicators of the ground level of water throughout the country is far below what might be wished; indeed, the data never will be adequate until the records suffice for the construction of a hydrologic map covering the entire country. Manifestly, too, the dependability of the records varies widely in different States and sections. In view of the incompleteness of the well census summarized herein, some effort has been made to fix some sort of standard for determining the degree of dependability of the figures for each State and region. In seeking such a standard, two or three propositions have been kept in mind:

(1) Whatever the trustworthiness of data relating to individual wells, the value of these wells as indicators of the ground level of water will vary with the degree in which they are representative of their respective neighborhoods.

(2) However representative the individual wells, their indicatorial value will depend on the extent of the area for which they stand, i. e., the area throughout which the surface configuration and subsurface structure are uniform.

(3) Whatever the configuration and structure in the immediate vicinity of a well, it can not be assumed that the relation between the ground level of water and the surface extends to more than a moderate distance in any direction.

(4) Whatever the indicatorial value of the wells of a given area, their general dependability will vary with the uniformity of their distribution.

On reviewing the distribution of the data in the light of these propositions it seemed probable that a considerable majority of the wells are representative, but that they are both too few and too unequally distributed to serve as fully dependable indicators of the general ground level of water in any State; and that in several States their indicatorial value is limited. Of course, the degree in which individual wells are representative could be fixed only by expert observation on the ground (in which respect more than any other the value of the records would have been enhanced by expert aid); for no general knowledge of the country supplemented by maps can fully cover the factors of configuration and structure and climate involved in the distribution of the subsoil water. Moreover, in areas of high relief, as in the Appalachian region, or of complex structure, as in the Cordilleran region, it would often be difficult even for an expert on the ground to determine what is and what is not a representative well, while the area for which it might be deemed representative would necessarily be restricted; and still greater are the

difficulties encountered by one not having the advantage of personal observation on the ground directed to the specific point at issue. Nevertheless, on summing the conditions in the light of the data, an arbitrary scale of dependability was worked out, and is employed for what it is worth.

As the basis of the scale, it is assumed that the standard or norm of maximum dependability would be afforded by full data for all the wells in the county, State, or region; this being a practical basis rather than the ideal one which would be afforded by a large or unlimited number of wells, distributed according to the convenience or desire of the observer. The norm is put at 100 per cent, or, for greater convenience in general classification, at 10. It is next assumed that the area covered by the data is of three grades or degrees in uniformity of surface and simplicity of structure (which may be grouped as *equability*), i. e., maximum, medium, and minimum; and it is assumed that the inequalities in distribution balance each other from area to area, so that this factor may be neglected. It is finally assumed (and this is the most arbitrary assumption of all) that under maximum equability as found in the United States the indicatorial dependability of a well representing an area of three or four miles radius (or, say, one per township) should be half that afforded by all the wells ordinarily occurring within that area (perhaps ranging from one to half a dozen or more per section or square mile); that in regions of medium equability the indicatorial value should average 10 per cent less; and that in areas of minimum equability the value should be still lower by some 20 per cent. On these assumptions the following dependability scale was worked out and is used in the table showing the distribution of the data:

Scale of dependability.

Index.	Conditions.	Cases.
10	All wells.	
9	Maximum equability: 1 to 2 square miles per well	
8	Maximum equability: 2 to 5 square miles per well	
8	Medium equability: 1 to 2 square miles per well	
7	Maximum equability: 5 to 15 square miles per well	
7	Medium equability: 2 to 5 square miles per well	
6	Maximum equability: 15 to 30 square miles per well	
6	Medium equability: 5 to 15 square miles per well	
6	Minimum equability: 1 to 2 square miles per well	
5	Maximum equability: 30 to 50 square miles per well	Illinois, Indiana, Iowa.
5	Medium equability: 15 to 30 square miles per well	Delaware.
5	Minimum equability: 2 to 5 square miles per well	
4	Maximum equability: 50 to 100 square miles per well	Kansas, Michigan, Minnesota, Nebraska, North Dakota, Oklahoma, South Dakota, Wisconsin.
4	Medium equability: 30 to 50 square miles per well	Kentucky, Missouri, New Jersey, Ohio, Virginia, West Virginia.
4	Minimum equability: 5 to 15 square miles per well	
3	Maximum equability: 100 to 250 square miles per well	Florida, Louisiana, Texas.
3	Medium equability: 50 to 100 square miles per well	Alabama, Arkansas, Georgia, Maryland, Mississippi, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, Tennessee.

Scale of dependability—Continued.

Index.	Conditions.	Cases.
3	Minimum equability: 15 to 30 square miles per well	
2	Maximum equability: 250 to 500 square miles per well	
2	Medium equability: 100 to 250 square miles per well	Connecticut, Massachusetts, Vermont.
2	Minimum equability: 30 to 50 square miles per well	
1	Maximum equability: 500 and over square miles per well	
1	Medium equability: 250 to 500 square miles per well	New Hampshire.
1	Minimum equability: 50 to 100 square miles per well	
1—	Medium equability: 500 and over square miles per well	Maine.
1—	Minimum equability: 100 and over square miles per well	Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming.

Practically, a dependability of less than 2 on the arbitrary scale for any State may be considered to exclude it from serious consideration, so far as the present record is concerned, in regard to its relation between the ground level of water and the surface. Under this criterion 13 States would be excluded—Maine and New Hampshire in New England and the 11 States in the Cordilleran region. Reckoned roughly for the well regions, the indicatorial dependability is as follows:

Region.	Number of wells.	Dependability index.
1. New England	250	1.8
2. Eastern coast plain	963	3.5
3. Appalachian	4,582	3.3
4. Southern coast plain	2,930	3.0
5. Interior	8,975	4.4
6. Ozarkian	2,058	3.7
7. Plains	6,821	3.7
8. Cordilleran	2,327	.8
Aggregate	28,906	3.5

In the light of the distribution it would appear that the records herein assembled may be considered to indicate in a reasonably dependable way the relations between the subsoil water level and the surface in six of the eight well regions, the degree of dependability being greatest in the Interior region, but in New England, and especially in the Cordilleran region, the data are too meager to stand for more than sporadic cases, insusceptible of useful generalization. They record typical experiences, but can not be regarded as measuring general relations.

Primarily the scale is designed merely to indicate the dependability of the figures with respect to the relation between the subsoil water level and the surface; the indicatorial value of the figures would be less with respect to change in the subsoil water level. The probable direction and amount of error in the figures for change in subsoil water level are treated in later pages.

THE DATA BY STATES.

The following State summaries represent the data as taken from the 'county sheets," and include not only the information given directly by reporters but other figures derived therefrom by computation. In each case the State summary is followed by the "proportionate depths" table.

ALABAMA.

NORTHEASTERN.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Bibb	*a* 3	1885	4	43.5	4	4.7	4	3.2	4	....	.....	2	6	4	40.2
Blount	*a* 15	1882	20	32	15	8.1	20	7.3	15	4	11	3	7	20	24.7
	b 2	1902	2	61	2	25	2	25	2	....	.....	....	.....	2	36
Calhoun	*a* 4	1867	4	87.5	4	11.7	4	0	4	....	.....	4	47	4	87.5
Chambers	*a* 12	1872	12	30	12	5.5	12	4.5	12	....	.....	6	12	12	25.5
Cherokee	*a* 8	1887	10	43.7	10	7.2	7	5.9	7	....	.....	1	4	10	36.8
Chilton	*a* 4	1889	6	44.2	4	3	6	3.3	4	....	.....	....	.....	6	40.8
	b	.....	2	120	....	.....	2	45	0	....	.....	....	.....	2	75
Clay	*a* 17	1895	36	37.8	22	8.3	35	6.8	21	1	4	15	51	36	30.9
Coosa	*a* 6	1897	10	41.3	6	6.2	10	4.7	6	....	.....	4	12	10	36.6
Dekalb	*a* 12	1893	15	31.9	9	12.1	15	12.4	9	1	1	4	6	15	19.4
	b	.....	2	80	....	.....	2	30	0	....	.....	....	.....	2	50
Elmore	*a* 11	1894	11	34.5	8	4.9	11	4.5	8	....	.....	5	12	11	29.9
Etowah	*a* 10	1879	10	38.7	10	9.6	7	5.3	7	....	.....	4	9	10	30
Jackson	*a* 7	1899	12	44.8	11	10	12	6.2	11	....	.....	8	40	12	38.7
Jefferson	*a* 2	1880	2	27.5	....	.....	2	4.5	0	....	.....	....	.....	2	23
Lee	*a*	.....	2	45	2	5	....	.....	0	....	.....	....	.....	2	40
Marshall	*a* 10	1897	13	29.6	12	11.2	13	10.7	12	2	6	4	12	13	18.9
	b 2	1904	2	80	2	20	2	20	2	....	.....	....	.....	2	60
Randolph	*a* 12	1885	14	50	12	5.5	14	4.1	12	....	.....	8	16	14	45.9
St. Clair	*a* 6	1881	9	42.4	9	7.2	9	4.4	9	....	.....	6	25	9	37.9
Shelby	*a* 3	1893	4	24.7	4	11	4	11	4	....	.....	....	.....	4	13.7
Talladega	*a* 9	1852	9	61.7	9	14.9	9	8.9	9	....	.....	6	54	9	52.8
	b 1	1909	1	108	1	8	1	8	1	....	.....	....	.....	1	100
Tallapoosa	*a* 3	1880	6	30.5	6	5.2	6	4.2	6	....	.....	5	6.5	6	26.3
Total	*a* 154	1885.1	209	39.4	169	8.3	200	6.5	160	8	22.0	85	319.5	209	32.7
	b 5	1904.4	9	87.8	5	19.6	9	27.6	5	0	0.0	0	0.0	9	60.2

NORTHWESTERN.

Colbert	*a* 1	1904	1	30	1	2.5	....	.....	0	....	.....	....	.....	1	27.5
Cullman	*a* 13	1892	17	28.5	9	4.7	16	5.6	8	....	.....	2	6	17	22.9
Fayette	*a* 3	1907	3	33.7	2	5	3	7	2	....	.....	....	.....	3	26.7
Franklin	*a* 8	1904	10	39.9	10	4.3	9	4.1	9	1	1.5	6	6	10	36
	b 4	1898	4	71	1	20	4	36	1	....	.....	1	2	4	35
Lauderdale	*a* 3	1893	5	35.6	3	3	5	3.2	3	....	.....	....	.....	5	32.4
Lawrence	*a* 8	1893	8	29.9	8	14.2	8	12.6	8	1	2	4	15.5	8	17.3
Limestone	*a* 6	1871	6	32	6	4.7	6	6.2	6	5	8.5	....	.....	6	25.8
Madison	*a* 5	1866	7	32.7	5	8.2	7	4.8	5	....	.....	3	13	7	27.9
	b 2	1905	2	108	2	67.5	2	67.5	2	....	.....	....	.....	2	40.5
Marion	*a* 12	1895	15	27	12	8	14	6.4	11	....	.....	4	14.5	15	20.7
Morgan	*a* 7	1880	10	32.9	10	12.2	7	11.4	7	2	3	1	10	10	21.4
	b 3	1891	4	80.2	4	20.5	3	9.3	3	1	1	2	25	4	65.7
Tuscaloosa	*a* 3	1900	3	26.7	3	2.7	3	2.3	3	....	.....	1	1	3	24.3
Walker	*a* 13	1881	14	28.9	12	7.3	13	6.2	11	....	.....	7	15	14	22.9
	b 3	1904	3	103.3	3	68.3	3	62.3	3	....	.....	2	18	3	41
Winston	*b* 1	1910	1	115	1	15	....	.....	0	....	.....	....	.....	1	100
Total	*a* 82	1887.0	99	31.0	81	7.5	91	6.5	73	9	15.0	28	81.0	99	24.5
	b 13	1900.1	14	89.0	11	41.6	12	41.2	9	1	1.0	5	45.0	14	50.5

SOUTHERN.

Autauga	*a* 7	1896	8	33.9	8	3.2	7	2.9	7	....	.....	3	1.5	8	30.9
Baldwin	*a* 9	1905	11	37.5	7	15.3	10	14.4	6	2	1.5	2	11	11	23
	b 2	1897	3	81	2	8	3	11	2	....	.....	2	13	3	70
Barbour	*a* 2	1895	4	46.2	4	3.7	4	1.2	4	....	.....	4	10	4	45
Bullock	*a* 1	1850	1	16	1	6	1	4	1	....	.....	1	2	1	12
Butler	*a* 9	1897	9	43.1	9	4.6	8	5.7	8	5	8	....	.....	9	37.7
	b	.....	1	85	1	6	1	6.5	1	1	0.5	....	.....	1	78.5

ALABAMA—Continued.

SOUTHERN—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Choctaw	*a* 6	1898	7	31.6	7	5	7	4	7			2	7	7	27.6
Clarke	*a* 4	1891	6	51.5	6	5.2	6	5.5	6	2	2			6	46
	b 1	1896	3	82	3	4.3	3	4.3	3					3	77.7
Coffee	*a* 3	1882	5	48	3	3.3	5	3.5	3			1	0.5	5	44.5
	b		1	100			1	7	0					1	93
Conecuh	*a* 13	1899	13	37.6	12	6.2	13	5.6	12			3	5	13	32
	b 1	1907	1	90	1	60	1	60	1					1	30
Covington	*a* 3	1901	9	37.1	4	5.2	9	4.7	4			3	5.5	9	32.4
Crenshaw	*a* 6	1887	12	37.7	8	6	11	6.5	11			3	4.5	12	31.5
	b		1	265			1	235	0					1	30
Dale	*a* 6	1879	6	45.8	6	3.9	3	2.7	3			3	1.5	6	42.2
Dallas	*a* 6	1890	14	34.6	11	4.4	9	5.7	6	3	9			14	29.6
Escambia	*a* 12	1898	12	35.4	9	7.2	12	6	9	2	3	4	7	12	29.4
Geneva	*a*		3	27			3	9	0					3	18
	b		2	84			2	20	0					2	64
Greene	*a* 1	1890	1	20			1	2	0					1	18
	b		2	75			2	52.5	0					2	22
Hale	*a* 7	1892	10	40.5	10	4.5	10	4.5	10					10	35.9
Henry	*a* 3	1900	9	43.3	2	3.5	9	3.9	2					9	39.4
Houston	*a* 1	1898	4	40.7			4	4.5	0					4	36.2
Lamar	*a* 6	1902	11	27.9	5	5	11	3.5	5			3	6	11	24.4
	b 3	1907	3	120	3	120	3	120	3					3	0
Lowndes	*a* 7	1891	10	21.9	8	6.7	10	2.3	8	1	1	7	38	10	19.6
	b		2	657.5	1	615	2	592.5	1			1	30	2	65
Mason	*a* 3	1872	8	36.1	8	3.6	8	3.2	8			3	3	8	32.9
Marengo	*a*		1	30			1	4	0					1	26
Mobile	*a* 2	1907	7	39.9	6	8.8	5	6.4	3					7	31
	b		1	80	1	10			0					1	70
Monroe	*a* 6	1874	8	36.1	6	6.5	8	4.7	6			5	7	8	31.4
	b 3	1894	3	65.7	3	7	3	6.3	3			1	2	3	59.3
Montgomery	*a* 11	1887	12	25.3	12	4.1	8	4.4	8			2	1.5	12	21.4
	b 1	1860	1	100	1	5			0					1	95
Perry	*a* 3	1862	3	31	3	5.7	3	5.3	3			1	1	3	25.7
	b 3	1874	3	400	3	400	3	394.3	3			1	17	3	5.7
Pickens	*a* 1	1887	3	32.7	3	3	3	1	3			3	6	3	31.7
Washington	*a* 6	1903	8	28.6	6	6	8	7	6			3	3	8	21.6
Wilcox	*a* 15	1871	24	31.9	17	7.3	23	5.7	16	1	1	8	19	24	26.3
	b 1	1910	1	140	1	115			0					1	25
Total	*a* 159	1890.5	239	35.4	181	5.7	220	5.2	165	16	25.5	64	140.0	239	29.8
	b 15	1892.7	28	169.2	20	121.0	25	129.8	17	1	0.5	5	62.0	28	45.3
State total	*a* 395	1887.7	547	36.1	431	7.0	511	5.9	398	33	62.5	177	540.5	547	29.9
	b 33	1897.4	51	132.8	36	82.7	46	86.7	31	2	1.5	10	107.0	51	49.4
Aggregate	428	1888.4	598		467		557		429	35	64.0	187	647.5	598	31.6

PROPORTIONATE DEPTHS—NORTHEASTERN.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Bibb	2		2	2			4	Jefferson	1		2				2
Blount	9		15	7			22	Lee	1		1	1			2
Calhoun	1				4		4	Marshall	5	1	12	1	1		15
Chambers	4		10	2			12	Randolph	5		4	9	1		14
Cherokee	5		3	6	1		10	St. Clair	3		5	3		1	9
Chilton	3		1	5	2		8	Shelby	2		4				4
Clay	10	3	20	10	3		36	Talladega	4		2	4	3	1	10
Coosa	3			10			10	Tallapoosa	3		5		1		6
Dekalb	5	1	13	3			17								
Elmore	4	1	4	6			11	20 counties	78	6	116	76	18	2	218
Etowah	4		6	4			10	Per cent		2.7	53.2	34.9	8.3	0.9	
Jackson	4		7	3	2		12								

PROPORTIONATE DEPTHS—NORTHWESTERN.

Colbert	1		1				1	Marion	5	1	12	2			15
Cullman	5		16	1			17	Morgan	4		9	3	1	1	14
Fayette	2		2	1			3	Tuscaloosa	1		3				3
Franklin	5		7	5	2		14	Walker	7	1	11	4	1		17
Lauderdale	1		3	2			5	Winston	1				1		1
Lawrence	3		8				8								
Limestone	2		5	1			6	13 counties	40	2	83	22	5	1	113
Madison	3		6	3			9	Per cent		1.8	73.4	19.5	4.4	0.9	

ALABAMA—Continued.

PROPORTIONATE DEPTHS—SOUTHERN.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Autauga	4	.....	3	5	....	....	8	Henry	2	.....	3	5	1	....	9
Baldwin	6	.....	9	3	2	....	14	Houston	1	.....	2	1	1	....	4
Barbour	2	.....	1	3	....	....	4	Lamar	4	3	9	2	....	....	14
Bullock	1	.....	1	.....	....	....	1	Lowndes	4	1	9	1	1	....	12
Butler	4	.....	1	8	1	....	10	Macon	3	.....	6	1	1	....	8
Choctaw	2	.....	5	2	....	....	7	Marengo	1	.....	1	.....	....	....	1
Clarke	2	.....	3	1	5	....	9	Mobile	3	.....	4	3	1	....	8
Coffee	4	.....	1	3	2	....	6	Monroe	4	1	2	6	2	....	11
Conecuh	5	.....	8	6	....	....	14	Montgomery	4	.....	10	2	1	....	13
Covington	3	.....	4	5	....	....	9	Perry	2	2	3	1	....	....	6
Crenshaw	4	2	5	5	1	....	13	Pickens	1	.....	1	2	....	....	3
Dale	2	.....	1	5	....	....	6	Washington	3	1	6	1	....	....	8
Dallas	5	.....	9	5	....	....	14	Wilcox	8	1	16	8	....	....	25
Escambia	4	.....	9	3	....	....	12								
Geneva	2	.....	3	1	1	....	5	30 counties	96	13	140	92	22	0	267
Greene	2	1	1	1	....	....	3	Per cent	....	4.9	52.4	34.5	8.2	....	....
Hale	4	1	4	3	2	....	10								

Among instructive remarks by reporters are these:

Blount County: Some wells dry; a number of springs have broken out and run all the time" (observation of 40 years). "No change in water table." "A spring started 5 years ago nearly on top of a mountain and runs even during the longest and severest droughts." Jackson County: "Two wells [into which quicksilver is alleged to have been put] and one spring failed." Randolph County: "Four springs have failed in the last 10 years." Madison County: "No change in the ground streams during the past 50 years." Marion County: "The water level has not changed; no springs have gone dry." Escambia County: "Wells have been dug from time to time 2 or 3 feet deeper since they were first dug." Hale County: "No change in wells for 50 years. Henry County: "Have never known wells to fail; springs also never fail." Houston County: "Have lived on this place 70 years; have had plenty of water for man and beast." Lowndes County: Lowering of wells ascribed to lack of rain. Mobile County: "no springs have failed." Monroe County: "The water level has not changed in the last 20 years." Montgomery County: "Numbers of springs and wells that furnished water 50 years ago are now dry." Wilcox County: "Some springs have gone dry."

ARIZONA.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Apache	*a* 7	1904	7	18	7	3	7	2.9	7	....	.....	2	1	7	15.1
Cochise	*a* 3	1904	4	34.7	4	13.1	4	13.1	4	....	.....	....	.....	4	21.6
	b 4	1906	4	169	3	6	4	6.4	5	1	1	1	1	4	162.6
Gila	*a* 4	1899	4	13	3	5.7	4	5.1	3	1	1	1	0.5	4	7.9
Graham	*a* 2	1897	3	29.3	2	3.2	3	3.2	2	....	.....	....	.....	3	26.2
	b 2	1901	2	70	2	7	2	25	2	2	36	....	.....	2	45
Maricopa	*a* 6	1902	6	26.4	6	12.2	5	15.4	5	2	11.5	....	.....	6	12.2
	b 2	1909	2	75	2	21	2	22.5	2	1	3	....	.....	2	52.5
Navajo	*a* 4	1899	4	40.2	4	3.9	4	4.5	4	2	5	1	0.5	4	35.7
Pinal	*a* 2	1908	2	27	2	12	2	5	2	....	.....	2	14	2	22
	b 3	1888	3	171.3	3	27.3	3	27.3	3	....	.....	....	.....	3	144
Yuma	*a* 3	1908	3	38.3	3	18	3	18	3	....	.....	....	.....	3	20.3
Total	*a* 31	1902.7	33	27.1	31	8.5	32	8.2	30	5	17.5	6	16.0	33	19.1
	b 11	1901.0	11	134.6	10	15.6	11	18.4	10	4	40.0	1	1.0	11	116.1
Aggregate	42	1902.3	44	.....	41	.....	43	.....	40	9	57.5	7	17.0	44	43.2

ARIZONA—Continued.

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Apache	2	.....	7	.....	....	....	7	Pinal	2	.....	2	.....	....	3	5
Cochise	3	1	2	1	1	3	8	Yuma	1	.....	3	.....	....	....	3
Gila	2	3	1	.....	....	....	4								
Graham	2	.....	1	4	....	....	5	8 counties	16	6	21	10	1	6	44
Maricopa	2	2	4	2	....	....	8	Per cent	....	13.7	47.7	22.7	2.2	13.7	....
Navajo	2	.....	1	3	....	....	4								

ARKANSAS.

NORTHWESTERN.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean
Baxter	*a* 11	1892	11	46	11	14.7	11	13	11	2	4	4	23	11	33
	b 4	1904	4	84	4	46.2	4	46.2	4	....	.....	....	.....	4	37.7
Benton	*a* 11	1884	16	33.3	8	5.7	16	5.4	8	1	3	3	7	16	27.9
	b 8	1901	13	78.5	10	43.3	11	40.1	8	....	.....	1	6	13	40.8
Boone	*a* 7	1884	9	24.8	7	5.1	9	4.8	7	2	2	1	2	9	20
	b 2	1895	4	113.7	2	20	4	23.7	2	....	.....	....	.....	4	90
Carroll	*a* 4	1896	9	40.7	7	8.7	5	14.2	3	2	3	1	2	9	31.6
	b 2	1909	3	77.3	....	.....	3	20.7	0	....	.....	....	.....	3	56.7
Clark	*a* 7	1889	15	25.3	8	6	15	4.3	8	....	.....	3	11.5	15	21
	b 3	1887	5	105	4	91.2	5	85	4	....	.....	....	.....	5	20
Cleburne	*a* 1	1907	3	37	3	14	2	19.5	2	....	.....	....	.....	3	23
Conway	*a* 8	1890	9	36	9	11.7	9	10.8	9	....	.....	3	8	9	25.2
	b 2	1890	2	94	2	21	2	12.5	2	1	3	1	20	2	81.5
Crawford	*a* 29	1893	35	29.6	17	14.5	35	9.8	17	1	2	6	13	35	19.8
	b 1	1900	2	106.5	1	40	2	50	1	....	.....	....	.....	2	56.5
Faulkner	*a* 20	1886	28	30.4	20	9.4	26	9	18	4	14	4	14	28	21.8
	b 3	1899	4	227	4	200	4	190.5	4	1	7	2	45	4	36.5
Franklin	*a* 12	1892	12	29.7	12	10.6	10	8.5	10	....	.....	4	6	12	19.7
	b 3	1893	3	64	3	25	2	20.2	2	....	.....	2	4.5	3	43.8
Fulton	*a* 2	1900	3	24.7	2	7.5	3	6	2	....	.....	....	.....	3	18.7
	b 5	1908	6	97.3	5	34.4	6	37	5	....	.....	....	.....	6	60.3
Garland	*a* 8	1898	9	34.3	7	8.9	7	7.1	5	....	.....	2	15	9	26
	b 1	1890	1	105	1	25	1	18	1	....	.....	1	7	1	87
Hempstead	*a* 2	1907	2	21.5	2	3	2	3	2	....	.....	....	.....	2	18.5
	b 8	1902	8	359.6	6	276.8	8	332.6	6	....	.....	....	.....	8	27
Hot Spring	*a* 7	1887	12	32.4	7	7	12	5.4	7	1	1	5	12	12	27
Howard	*a* 13	1889	21	28.6	16	6.2	20	4.2	15	1	1	9	30.5	21	24.4
	b 2	1905	2	270	2	270	....	.....	0	....	.....	....	.....	2	0
Independence	*a* 15	1888	18	34.8	17	5.6	16	5.1	15	1	0.5	3	8.5	18	29.2
	b 5	1905	5	106.4	5	29.2	2	35	2	....	.....	....	.....	5	77.2
Izard	*a* 4	1883	4	52	4	5	4	4.2	4	1	3	2	6	4	47.7
	b 1	1907	1	90	1	30	1	30	1	....	.....	....	.....	1	60
Johnson	*a* 21	1889	30	26.5	21	8.1	30	6.4	21	3	6	5	21.5	30	20.1
	b 3	1900	9	106.1	5	103	9	66.7	5	....	.....	1	10	9	39.4
Little River	*a* 10	1892	11	21	11	6.1	11	5	11	....	.....	6	13	11	16
Logan	*a* 10	1893	13	30.5	12	13.4	13	11.4	12	....	.....	3	17.5	13	19.1
Madison	*a* 21	1894	24	22.7	19	7.3	24	6.1	19	4	7	9	28.5	24	16.5
	b 3	1904	3	73.3	2	42.5	3	31	2	....	.....	....	.....	3	42.3
Marion	*a* 1	1894	4	21	1	3	4	4.7	1	....	.....	....	.....	4	16.2
	b 2	1899	4	105.2	1	25	4	22	1	....	.....	....	.....	4	83.2
Montgomery	*a* 5	1897	9	28	5	3.4	9	3.6	5	....	.....	2	2	9	24.4
Newton	*a* 4	1888	5	23.6	3	12.7	5	8.8	3	....	.....	2	8	5	14.8
Perry	*a* 8	1893	8	30.5	8	10.1	8	7.6	8	3	5	3	25	8	22.9
Pike	*a* 9	1885	9	27.1	9	5.4	9	2.8	9	....	.....	7	23.5	9	24.3
Polk	*a* 9	1892	9	29.9	6	4.7	9	4.8	6	3	3	2	3.5	9	25.1
Pope	*a* 13	1885	16	30	14	13.3	13	8.3	11	1	3	8	33	16	19.3
Randolph	*a* 5	1889	8	36.2	5	11	8	8.7	5	1	1	3	5	8	27.5
	b 5	1900	6	105.8	5	42.2	5	52.2	4	....	.....	....	.....	6	52.3
Saline	*a* 12	1882	15	23.1	15	5.7	15	3.8	15	....	.....	9	28.5	15	19.4
Scott	*a* 17	1885	20	25	20	8.8	20	6.9	20	2	2	7	40	20	18.1
	b 7	1900	7	68.3	7	24.4	7	22.3	7	....	.....	2	15	7	46
Searcy	*a* 6	1877	6	47.3	6	7.3	3	4.5	3	....	.....	3	12.5	6	42.1
	b	.....	1	90	....	.....	1	30	0	....	.....	....	.....	1	60
Sebastian	*a* 7	1895	9	25	9	9.1	8	4.9	8	....	.....	6	29	9	19.1
	b 1	1887	3	70.5	1	34	3	44.7	1	....	.....	....	.....	3	25.8
Sevier	*a* 6	1902	8	40.5	3	5	8	4.9	3	....	.....	....	.....	8	35.6
Sharp	*a* 4	1866	4	31	4	10.2	4	9.5	4	2	5	1	8	4	21.5
	b 3	1901	5	104	5	57	5	53.2	5	....	.....	1	19	5	50.8
Stone	*a* 7	1902	10	33.1	7	4.6	10	5.1	7	3	14	....	.....	10	28
Van Buren	*a* 19	1895	23	29.1	17	9.3	23	9	17	2	3	1	3	23	20.1
Washington	*a* 22	1889	22	32.3	22	5.8	21	5.2	21	1	1	6	8.5	22	26.8
	b 3	1907	3	103.7	3	56.7	3	56.7	3	....	.....	....	.....	3	47
Yell	*a* 19	1891	21	23.2	18	9.7	20	8.9	17	3	5	3	8	21	13.8
Total	*a* 396	1889.9	500	30.5	392	8.5	477	7.0	369	44	88.5	136	476.5	500	22.6
	b 77	1909.8	104	121.5	79	76.6	95	73.0	70	2	10.0	11	126.5	104	47.7

ARKANSAS—Continued.

SOUTHEASTERN.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Arkansas	*b* 9	1897	14	113.7	10	70.4	14	69	10	....	.....	2	13	14	44.7
Ashley	*a* 2	1905	6	32.5	2	4.5	6	9.5	2	....	.....	....	.....	6	23
	b 1	1905	2	172.5	1	250	2	140	1	....	.....	....	.....	2	32.5
Bradley	*a* 10	1894	15	31.9	4	4.7	15	6.6	4	3	3	....	.....	15	25.3
Calhoun	*a* 3	1897	3	25.3	....	.....	3	2.7	0	....	.....	....	.....	3	22.7
Chicot	*a* 3	1903	5	33.4	5	12	5	10.4	5	....	.....	2	8	5	23
	b	.....	4	82.2	....	.....	4	43.2	0	....	.....	....	.....	4	39
Clay	*a* 4	1905	14	32.9	6	8.2	11	4.7	3	....	.....	1	2	14	26.6
	b 5	1905	5	103.8	5	8.2	5	7.2	5	....	.....	4	7	5	96.6
Cleveland	*a* 11	1880	11	22.7	10	6.3	11	5.6	10	3	5	4	9	11	17.1
Columbia	*a* 15	1892	17	31.2	15	6.2	17	5.9	15	....	.....	3	7.5	17	25.4
	b	.....	1	90	1	17.5	1	10.5	1	....	.....	1	7	1	79.5
Craighead	*a* 3	1895	6	28.5	....	.....	6	11.2	0	....	.....	....	.....	6	17.3
Crittenden	*a* 2	1905	5	39.8	5	9	3	10	3	....	.....	....	.....	5	30.8
Cross	*a* 6	1887	6	52.5	6	7.5	6	7	6	....	.....	2	3	6	45.5
	b 6	1904	6	78.2	6	36.3	6	36.3	6	....	.....	....	.....	6	41.8
Dallas	*a* 3	1887	4	46.2	3	2.8	4	4.6	3	....	.....	....	.....	4	41.6
Desha	*a* 1	1900	3	21.7	....	.....	3	8	0	....	.....	....	.....	3	13.7
	b 1	1910	4	282.5	1	500	3	110	0	....	.....	....	.....	4	75
Drew	*a* 4	1879	14	24.4	5	3.6	13	4.2	4	2	7	....	.....	14	20.1
	b 2	1901	3	214	2	248	3	182	2	....	.....	....	.....	3	32
Grant	*a* 9	1893	10	26.6	10	5.9	9	7.2	9	4	11	1	1	10	19.7
Greene	*a* 7	1885	7	33.1	7	10.3	7	9.4	7	....	.....	1	6	7	23.7
	b	.....	1	113	....	.....	1	58	0	....	.....	....	.....	1	55
Jackson	*a* 6	1901	9	28	9	11.9	7	9.4	7	....	.....	3	6	9	16.8
Jefferson	*a* 8	1900	13	32.2	9	12.3	12	12.4	8	....	.....	2	10	13	19.2
	b 3	1901	4	67.2	3	34.3	3	40.3	2	....	.....	....	.....	4	27.7
Lafayette	*a* 7	1880	7	29.9	4	4.1	5	3	2	....	.....	2	7.5	7	26.4
Lawrence	*a* 7	1892	16	41.4	10	16.8	15	11	9	3	3.5	4	10	16	29.2
	b 3	1906	3	87	3	27	3	27	3	....	.....	....	.....	3	60
Lincoln	*a* 12	1891	15	26.8	15	8.6	14	7.8	14	1	1.5	4	5.5	15	18.5
Lonoke	*a* 8	1894	16	37.9	13	12.2	15	9.1	12	....	.....	5	34	16	29
	b	.....	2	77.5	1	70	2	42.5	1	....	.....	....	.....	2	35
Miller	*a* 9	1892	9	27.7	9	6.2	9	6.3	9	2	1.5	....	.....	9	21.3
Mississippi	*a* 11	1902	19	24.9	15	9.3	15	8.9	11	....	.....	7	17	19	16.7
Monroe	*a* 3	1877	7	26	2	15	7	10.7	2	....	.....	....	.....	7	15.3
	b 1	1895	2	112.5	....	.....	2	52.5	0	....	.....	....	.....	2	60
Nevada	*a* 13	1891	15	26.5	15	5	14	3.7	14	....	.....	9	20	15	22.9
	b 1	1906	1	248	1	228	1	228	1	....	.....	....	.....	1	20
Ouachita	*b* 7	1878	7	23.7	6	5.7	7	4.7	6	....	.....	1	4	7	19
Phillips	*a*	.....	4	32.5	....	.....	4	15	0	....	.....	....	.....	4	17.5
Poinsett	*a* 4	1899	4	29.2	2	10	3	8.3	1	....	.....	....	.....	4	21
	b 2	1898	2	73.5	2	20	2	20	2	....	.....	....	.....	2	53.5
Prairie	*a* 2	1899	10	28.5	4	6.7	10	9	4	1	1	....	.....	10	19.5
	b 3	1899	4	134.5	3	42.3	4	91.7	3	....	.....	....	.....	4	42.7
Pulaski	*a* 8	1894	8	21.2	6	6.8	8	6.6	6	4	6	1	1	8	14.6
	b 1	1909	1	80	1	20	1	18	1	....	.....	1	2	1	62
Saint Francis	*a* 3	1904	5	44	5	5.2	3	2.5	3	....	.....	3	4.5	5	39.7
Union	*a* 10	1894	12	31.8	12	12.7	8	14.4	8	....	.....	3	22	12	21
White	*a* 14	1891	17	33.7	15	10.5	17	7.9	15	....	.....	8	36	17	25.8
	b 4	1895	5	75.8	5	27.4	5	27.4	5	....	.....	....	.....	5	48.4
Woodruff	*a* 8	1898	9	25.7	4	17.7	8	9.6	3	....	.....	....	.....	9	15.1
	b	.....	1	125	1	85	1	85	1	....	.....	....	.....	1	40
Total	*a* 216	1892.8	321	30.8	227	8.9	293	7.9	199	23	39.5	65	210.0	321	22.8
	b 49	1899.2	72	108.6	52	60.6	70	56.0	50	0	0.0	9	33.0	72	46.8
State total	*a* 612	1890.9	821	30.6	619	8.7	770	7.4	568	67	128.0	201	686.5	821	22.7
	b 126	1900.2	176	116.3	131	70.2	165	65.8	120	2	10.0	20	159.5	176	47.3
Aggregate	738	1892.5	997	.....	750	.....	935	.....	688	69	138.0	221	846.0	997	27.0

ARKANSAS—Continued.

PROPORTIONATE DEPTHS—NORTHWESTERN.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Baxter	5	2	7	4	2	....	15	Marion	2	1	3	1	2	1	8
Benton	9	2	12	14	1	....	29	Montgomery	4	.....	7	2	....	....	9
Boone	4	.....	8	1	2	2	13	Newton	2	2	2	1	....	....	5
Carroll	4	.....	6	6	....	....	12	Perry	3	.....	6	2	....	....	8
Clark	5	4	10	6	....	....	20	Pike	3	.....	7	2	....	....	9
Cleburne	1	1	.....	2	....	....	3	Polk	3	.....	7	2	....	....	9
Conway	4	1	6	2	2	....	11	Pope	6	2	12	2	....	....	16
Crawford	11	2	29	6	....	....	37	Randolph	5	1	6	5	....	2	14
Faulkner	11	2	23	7	....	....	32	Saline	5	1	14	....	....	....	15
Franklin	5	1	9	5	....	....	15	Scott	9	3	16	6	2	....	27
Fulton	4	2	2	2	3	....	9	Searcy	2	.....	1	5	1	....	7
Garland	3	.....	8	1	1	....	10	Sebastian	3	2	6	4	....	....	12
Hempstead	4	3	3	3	1	....	10	Sevier	3	.....	3	4	1	....	8
Hot Spring	4	1	5	6	....	....	12	Sharp	4	1	4	3	1	....	9
Howard	7	5	12	5	1	....	23	Stone	4	.....	7	3	....	....	10
Independence	8	2	9	9	2	1	23	Van Buren	8	2	19	1	1	....	23
Izard	2	.....	2	2	1	....	5	Washington	9	1	13	10	1	....	25
Johnson	12	9	18	11	1	....	39	Yell	8	6	14	1	....	....	21
Little River	4	1	9	1	....	....	11								
Logan	5	1	11	1	....	....	13	39 counties.	204	67	355	149	27	6	604
Madison	9	6	19	1	1	....	27	Per cent	....	11.0	58.8	24.7	4.5	1.0	....

PROPORTIONATE DEPTHS—SOUTHEASTERN.

Arkansas	6	.....	.....	14	....	....	14	Lawrence	7	.....	11	5	2	1	19
Ashley	2	.....	7	1	....	....	8	Lincoln	5	.....	13	2	....	....	15
Bradley	5	.....	10	5	....	....	15	Lonoke	6	.....	10	8	....	....	18
Calhoun	1	.....	3	.....	....	....	3	Miller	3	.....	9	.....	....	....	9
Chicot	3	.....	7	2	....	....	9	Mississippi	8	1	18	.....	....	....	19
Clay	7	2	7	5	2	3	19	Monroe	3	.....	7	1	1	....	9
Cleveland	4	1	10	.....	....	....	11	Nevada	6	.....	12	4	....	....	16
Columbia	5	.....	13	4	1	....	18	Ouachita	3	.....	7	.....	....	....	7
Craighead	3	2	3	1	....	....	6	Phillips	2	.....	4	.....	....	....	4
Crittenden	2	.....	3	2	....	....	5	Poinsett	2	.....	3	3	....	....	6
Cross	4	.....	.....	11	1	....	12	Prairie	6	.....	10	4	....	....	14
Dallas	1	.....	1	3	....	....	4	Pulaski	3	1	7	.....	1	....	9
Desha	2	.....	3	2	2	....	7	St. Francis	2	.....	.....	5	....	....	5
Drew	5	1	12	3	1	....	17	Union	4	2	9	.....	1	....	12
Grant	4	1	8	1	....	....	10	White	8	.....	13	9	....	....	22
Greene	3	1	5	2	....	....	8	Woodruff	4	.....	9	1	....	....	10
Jackson	4	.....	9	.....	....	....	9								
Jefferson	8	.....	15	2	....	....	17	35 counties.	144	12	264	101	12	4	393
Lafayette	3	.....	6	1	....	....	7	Per cent	....	3.1	67.2	25.6	3.1	1.0	....

Among the remarks by reporters are the following:

Boone County: "Water level varies with seasons." Carroll County: "A spring broke out during a drought last year on top of a mountain after a spring halfway down the mountain went dry." Cleburne County: "A spring is failing." Crawford County: "In over 20 years I notice no variation in depth of water." "Water the same for 20 years." "No perceptible change in the wells." Faulkner County: "Water is now as near the surface as ever." Franklin County: "Water in wells has sunk about 2 feet in the last 20 years." Fulton County: "The water level has remained the same for 26 years." "Water level practically unchanged since settlement." Howard County: "A spring failed through digging a near-by well, while another spring started." Independence County: "A spring made itself in July, 1909, in the very driest season, and furnishes water for three families." Johnson County: "Wells are affected by wet or dry weather." Little River County: "A slight lowering of the water level seems perceptible." "Two wells failed in 25 years; one was dug 9 feet deeper and lasted 3 or 4 years; then dug 6 feet deeper, and now it is all right." Logan County: "Some wells have failed because of wells being dug to great depths for factory purposes that seem to have taken the water from the upper veins." Montgomery County: "This is a newly settled country, and as the timber is cut off the water seems to be getting deeper." Pike County: "One well dug deeper seven times since it was first dug." Randolph County: "Depth of water has, with few exceptions, remained the same for 17 years." Saline County: "Water in all wells and springs has been falling more and more for the last 3 or 4 years."

Sharp County: "Several wells bored, but all have gone dry in a short time." Van Buren County: "Some springs have started since timber has been removed." Washington County: "Water supply unchanged in 40 years." "Some springs dry; others broke out during the dry weather." "Only one spring increased in flow; streams fed by springs have gone dry that were never known to do so until a few years ago, while the rainfall remains practically the same." Arkansas County: "No perceptible change in the water level." "Water level is at a depth of about 45 feet and seldom changes." "Water level some lower in summer, caused by pumping for rice irrigation." "Water level has lowered some since so many rice wells have been put down." Craighead County: "Water from driven pumps; open wells passed away long ago." Cross County: "No change in the underground water level in the last 22 years." Grant County: "An old-time spring failed." Greene County: "Water seems to be generally on a level and plenty of it." Jackson County: "Have never known a 20-foot well to go dry in 40 years." Miller County: "Two wells have failed." Mississippi County: Cypress stumps in place are used as wells. "Nevada County: "Some wells have ceased to flow, and some have grown weaker." Pulaski County: "Water level varies widely with the seasons."

While the remarks may in some cases appear inconsistent, each reporter undoubtedly describes what he knows; and the discrepancies are evidently due to physiographic facts or conditions attending settlement rather than to error in observation. Among the points brought out are (1) the starting of springs at high levels during drought (discussed in later pages); (2) the interdependence of springs and wells and the effect on common wells of deep-drilled wells yielding large supplies; (3) the lowering of the ground level of water attending clearing of the country; (4) the frequent deepening of wells, no doubt often without record, indicating the lowering of the water level; (5) the progressive drying up of streams; and (6) generally the steadier maintenance of water level beneath lowlands than uplands.

CALIFORNIA.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Alameda	*a*	3	1886	3	45	3	14	3	12.7	3	....	.....	2	4	3	32.3
Butte	*a*	3	1889	9	35	5	9.4	9	7.7	5	....	.....	....	.....	9	27.3
Calaveras	*a*	15	1881	18	47.1	15	10	18	9.1	15	1	2	2	3	18	38
Colusa	*a*	2	1890	2	40	2	30	....	.....	0	....	.....	....	.....	2	10
	b	1	1910	1	115	1	80	....	.....	0	....	.....	....	.....	1	35
Contra Costa	*a*	3	1875	8	38.1	4	6.7	8	11	4	1	4	1	5	8	27.1
	b	2	1879	2	119	2	89.5	2	89.5	2	....	.....	....	.....	2	29.5
Del Norte	*a*	5	1883	5	34.4	5	7.8	5	5.3	5	....	.....	5	12.5	5	29.1
Eldorado	*a*	7	1879	7	33.7	7	12.6	6	14	6	1	0.5	1	2	7	21.3
Fresno	*a*	7	1906	13	33	11	19.7	13	17.4	11	....	.....	....	.....	13	15.6
	b	4	1903	4	85.7	4	67.5	4	67.5	4	....	.....	....	.....	4	18.2
Glenn	*a*	3	1893	3	61.7	3	40.7	3	40.7	3	....	.....	....	.....	3	21
Humboldt	*a*	8	1894	12	33.9	11	10.5	12	9.7	11	....	.....	6	7.5	12	24.2
Kern	*a*	8	1899	8	43.7	8	22.5	8	20.4	8	2	2	2	19	8	23.4
	b	7	1905	9	261.2	9	243.3	9	243.4	9	1	1	....	.....	9	17.8
Kings	*b*	3	1888	3	109.3	3	8	3	2	3	....	.....	3	18	3	107.3
Lake	*a*	1	1880	3	16	....	.....	3	3	0	....	.....	....	.....	3	13
Lassen	*a*	16	1897	20	23.6	16	8.1	20	6.7	16	....	.....	7	23.5	20	17
	b	2	1907	3	148.3	3	105.3	3	103	3	....	.....	1	7	3	45.3
Los Angeles	*a*	8	1894	18	84.2	7	33.3	18	40.2	7	....	.....	4	34	18	44
	b	19	1895	22	302.4	18	259.3	22	236.9	18	....	.....	12	323	22	65.5
Madera	*a*	8	1892	10	25.2	9	8.1	10	8.1	9	1	3	....	.....	10	17.1
	b	3	1890	4	111.7	2	48	4	35.7	2	....	.....	1	10	4	76
Mendocino	*a*	25	1890	27	30.1	16	8.3	27	8.5	16	....	.....	9	26	27	21.6
Merced	*a*	2	1892	3	31.7	3	9.3	3	14.3	3	1	15	....	.....	3	17.3
	b	3	1907	3	72	3	42.7	3	46	3	1	10	....	.....	3	26
Modoc	*a*	3	1879	5	31.4	3	5	2	5	0	....	.....	....	.....	5	26.4
	b		.....	1	175	1	175	1	175	1	....	.....	....	.....	1	0

CALIFORNIA—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Monterey	a	10	1892	15	96.4	13	9.8	15	10.5	13	3	8	3	10	15	85.9
	b	9	1901	11	150.4	8	93.6	11	73.3	8	....	.....	1	3	11	77.1
Napa	a	3	1880	3	10.7	....	.....	3	5.3	0	....	.....	....	.....	3	5.3
Nevada	a	1	1880	2	22.5	1	3	2	1.2	1	....	.....	1	1.5	2	21.2
Orange	a	1	1898	1	19	1	9	1	9	1	....	.....	....	.....	1	10
	b	9	1901	9	198.6	9	155.1	9	151.3	9	....	.....	2	34	9	47.2
Placer	a	8	1870	8	43.7	4	8	8	7.2	4	....	.....	....	.....	8	36.5
	b	3	1895	3	93.3	1	30	3	53.3	1	....	.....	....	.....	3	40
Riverside	a	6	1902	8	53.6	4	8.5	7	13.6	3	....	.....	....	.....	8	41.1
	b	5	1905	7	202.4	3	26	7	112.4	3	....	.....	3	18	7	90
Sacramento	a	6	1864	7	24.3	7	9.7	7	4.9	7	....	.....	7	34	7	19.4
	b	2	1905	4	82.5	2	39	4	30.5	2	....	.....	2	20	4	52
San Bernardino	a	4	1899	4	32	3	6.7	4	12.5	3	....	.....	....	.....	4	19.5
	b	2	1905	4	525	....	.....	2	70	0	....	.....	....	.....	2	180
San Diego	a	22	1890	23	43.3	20	13.4	23	15.9	20	7	75	4	20	23	27.4
	b	5	1900	5	219.8	5	182.6	5	182.6	5	....	.....	....	.....	5	37.2
San Joaquin	b	3	1901	4	190.5	3	40	4	152.5	3	....	.....	....	.....	4	38
San Luis Obispo	a	21	1889	23	44.8	15	7.4	23	8.7	15	1	4	5	20.5	23	36.2
	b	10	1896	12	215.2	11	110.6	12	103.3	11	....	.....	....	.....	12	111.9
San Mateo	a	3	1870	4	28	3	26.3	4	21.2	3	....	.....	....	.....	4	6.7
	b	3	1887	4	251.2	3	306.7	4	235	3	....	.....	1	40	4	16.2
Santa Barbara	a	1	1889	2	25	1	4	2	9	1	1	11	....	.....	2	16
	b	3	1904	4	113.7	3	106.7	4	103.5	3	....	.....	....	.....	4	10.2
Santa Cruz	a	6	1885	7	23	7	9.9	7	9.2	7	....	.....	2	4	7	13.7
	b	1	1900	2	100.5	2	100.5	2	100.5	2	....	.....	....	.....	2	0
Shasta	a	6	1876	6	37.7	4	6.2	6	6.8	4	1	3	....	.....	6	30.8
Sierra	a	1	1910	1	10	....	.....	1	2	0	....	.....	....	.....	1	8
Siskiyou	a	10	1881	10	27.7	10	4.9	10	3.3	10	1	4	6	19.5	10	24.3
Solano	a	6	1888	6	52.2	6	34	6	34.3	6	1	2	....	.....	6	17.8
Sonoma	a	3	1896	7	31.3	5	13.4	7	11.4	5	....	.....	2	12	7	19.9
	b	2	1907	2	135	2	115.5	2	114	2	....	.....	1	3	2	21
Stanislaus	a	1	1884	5	43.2	1	18	5	22.4	1	....	.....	....	.....	5	20.8
	b	10	1898	11	120.1	9	39.2	11	43.5	9	....	.....	1	10	11	76.6
Sutter	a	7	1900	7	46.7	7	38.7	7	38.9	7	3	5	1	4	7	7.9
Tehama	a	5	1902	5	30.4	5	9.8	5	9.4	5	....	.....	2	2	5	21
	b	1	1896	1	180	1	120	1	120	1	....	.....	....	.....	1	60
Trinity	a		.....	4	14.7	3	3.2	4	1.9	3	....	.....	3	5	4	12.9
Tulare	a	5	1879	9	39.4	5	27.4	9	19.1	5	....	.....	2	7	9	20.3
Ventura	b	3	1898	3	107	3	46.7	3	50	3	2	10	....	.....	3	57
Yolo	a	6	1884	7	34.3	6	9.2	7	9.9	6	2	9	....	.....	7	24.4
	b		.....	2	115	....	.....	2	47.5	0	....	.....	....	.....	2	67.5
Yuba	a		.....	3	31.7	3	15	3	7.3	3	....	.....	3	23	3	24.3
Total	a	269	1889.0	351	40.7	262	13.2	344	13.2	255	27	147.5	80	299.0	351	27.5
	b	115	1899.0	140	195.0	111	135.1	137	126.9	110	4	21.0	28	486.0	138	59.7
Aggregate		384	1892.0	491	.....	373	.....	481	.....	365	31	168.5	108	785.0	489	36.6

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Alameda	1	....	2	1	....	....	3	Sacramento	3	....	8	2	1	....	11
Butte	5	1	5	2	1	....	9	San Bernardino	4	1	2	2	....	1	6
Calaveras	6	4	8	2	2	2	18	San Diego	12	9	13	3	3	....	28
Colusa	1	....	2	1	....	....	3	San Joaquin	2	....	....	4	....	....	4
Contra Costa	4	3	3	4	....	....	10	San Luis Obispo	10	7	11	6	4	7	35
Del Norte	2	....	2	3	....	....	5	San Mateo	2	6	1	1	....	....	8
Eldorado	4	1	4	2	....	....	7	Santa Barbara	3	2	4	....	....	....	6
Fresno	6	2	13	2	....	....	17	Santa Cruz	3	5	4	....	....	....	9
Glenn	1	....	2	1	....	....	3	Shasta	3	1	3	1	1	....	6
Humboldt	4	2	8	....	2	....	12	Sierra	1	1	....	....	....	....	1
Kern	6	5	7	5	....	....	17	Siskiyou	4	....	8	2	....	....	10
Kings	1	....	....	....	2	1	3	Solano	2	1	4	1	....	....	6
Lake	1	....	3	....	....	....	3	Sonoma	4	1	7	1	....	....	9
Lassen	9	9	7	5	2	....	23	Stanislaus	5	2	4	3	2	5	16
Los Angeles	13	4	13	9	10	4	40	Sutter	3	5	2	....	....	....	7
Madera	6	1	10	....	2	1	14	Tehama	2	2	2	2	....	....	6
Mendocino	5	3	20	4	....	....	27	Trinity	2	....	4	....	....	....	4
Merced	3	....	5	1	....	....	6	Tulare	4	....	8	1	....	....	9
Modoc	2	2	3	1	....	....	6	Ventura	1	....	....	2	1	....	3
Monterey	9	8	8	1	1	8	26	Yolo	4	1	4	3	1	....	9
Napa	1	3	....	....	....	....	3	Yuba	1	....	2	1	....	....	3
Nevada	1	....	2	....	....	....	2								
Orange	5	4	2	2	....	2	10	46 counties	179	97	231	87	40	34	489
Placer	3	1	6	2	2	....	11	Per cent	....	19.8	47.2	17.8	8.2	7.0	....
Riverside	5	....	5	4	3	3	15								

Remarks by reporters:

Alameda County: "Water level changes with the seasons." Calaveras County: "Springs show a marked increase in the last 20 years." Contra Costa County: "Water level raised by an earthquake." Fresno County: "Water level varies with rains." Lassen County: "Water in rivers lower than for years." Los Angeles County: "The water has been gradually going down for 15 years, caused by irrigation." "The water table has been lowered approximately 50 feet." Madera County: "After the Inyo earthquake (1872) a very large spring ceased to flow several years, but came back strong as ever." Mendocino County: "The earthquakes of 1898 and 1906 changed a good many springs, but more broke out than dried up." Merced County: "As a result of irrigation, water table is rising." Napa County: "During earthquake of 1906 some springs were shut off, and later were located at near-by points." Orange County: Wells artesian; "amount of flow is half what it was when first drilled." Riverside County: "An earthquake in May; all mountain streams increased after it." Sacramento County: "Engines while pumping hold the water level down from 16 to 25 feet." San Bernardino County: "In the valley basin the water plane has risen over a foot within 18 months; believed to be due to the distribution of winter storm water of Santa Ana River through the work of the Tri-Counties Reforestation committees." San Luis Obispo County: "Natural springs do not flow half what they did in 1884." Santa Barbara County: "Surface water has a lower level than 25 years ago, caused by denudation of canyons and mountain sides." "National forest established on watershed in 1898; wells stand higher now than ever before." Shasta County: "Since irrigation commenced about 1890, many springs have increased in flow and many new springs have broken out." Siskiyou County: "A spring running about 60 miners' inches broke out 7 years ago and has run undiminished." Sonoma County: "Water supply greatly increased since the earthquake of 1906." "Almost all wells have had less water since the earthquake of 1906." Stanislaus County: "Water level is rising 1 foot per year on account of irrigation." Sutter County: "Water level has risen owing to irrigation." Tulare County: "Since the earthquake at San Francisco the spring flow has about doubled and so remains."

On considering the foregoing remarks with reference to the geographic position of the several stations, it becomes clear (1) that both irrigation and earthquakes have affected the ground level of water; (2) that where irrigation is from mountain streams debouching into valleys the water level within the valleys has risen; (3) that where the irrigation water is from flowing or pumped wells the water level has lowered so greatly as materially to affect the relative level for the entire State; (4) that the immediate effect of earthquakes is generally to raise the water level; and (5) that a later effect is generally increased flow at lower levels, with gradual return to the earlier conditions at both lower and higher levels. It is noteworthy that several reporters observe the relation between the ground level of water and the control of the natural cover on mountain sides.

COLORADO.

MOUNTAIN.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Boulder	a		.....	3	24.7	2	5	3	4.3	2	....	.....	2	3	3	20.3
	b		.....	3	482	1	900	3	425.3	1	1	21	....	.....	3	56.7
Chaffee	a	3	1878	3	14.7	3	4	3	8.3	3	3	13	....	.....	3	6.3
Conejos	a	4	1881	7	24	7	6.9	4	3.5	4	....	.....	1	4	7	17.7
Costilla	b	1	1890	1	165	1	150	1	165	1	1	15	....	.....	1	0
Custer	a		.....	1	17	1	3	1	10	1	1	7	....	.....	1	7
Delta	a	1	1909	2	10	....	.....	2	3.5	0	....	.....	....	.....	2	6.5
Fremont	a	5	1901	5	29.2	4	5.7	5	6.6	4	....	.....	....	.....	5	22.6
Garfield	a	6	1894	8	53.2	6	5.2	8	6.1	6	....	.....	....	.....	8	47.1
	b	1	1900	1	532	1	524	1	524	1	....	.....	....	.....	1	8
Grand	a	8	1903	10	19.5	10	3.9	10	3.9	10	1	1	1	1	10	15.5
Gunnison	a	7	1887	7	26.4	7	6.3	7	5.7	7	....	.....	3	4	7	20.7
Jackson	a	2	1896	2	22	2	4	2	4	2	....	.....	....	.....	2	18
Jefferson	a	2	1891	2	41	2	9	2	23	2	2	28	....	.....	2	18
	b	1	1908	1	528	1	242	1	242	1	....	.....	....	.....	1	286
La Plata	a	5	1904	6	42.7	4	5.2	6	6.2	4	....	.....	1	0.5	6	36.4
	b	3	1907	3	212	3	132.7	3	138	3	1	16	....	.....	3	74
Larimer	a	12	1896	12	35.8	12	11	12	20.9	12	7	120	1	1	12	14.9
Las Animas	a	9	1889	9	22.9	9	5.2	9	5.1	9	2	1.5	2	2	9	17.8
Mesa	a		.....	1	20	1	2	1	2	1	....	.....	....	.....	1	18
	b	1	1910	1	1,200	1	1,200	1	1,200	1	....	.....	....	.....	1	0
Montezuma	a	1	1890	1	56	1	0	1	30	1	1	30	....	.....	1	26
Montrose	a	7	1900	7	29.1	5	4.4	7	14	5	3	6	....	.....	7	15.1
	b	1	1907	1	600	....	.....	1	420	0	....	.....	....	.....	1	180
Routt	a	10	1901	11	20.9	6	2.9	11	5.4	6	1	2	1	1	11	15.5
Saguache	a	2	1888	8	13.9	2	5.5	8	4.4	2	....	.....	1	1	8	9.5
	b	1	1902	4	470	4	470	4	470	4	....	.....	....	.....	4	0
San Miguel	a	1	1910	1	35	....	.....	1	34	0	....	.....	....	.....	1	1
Teller	a	8	1898	8	32.7	5	4.3	8	4.2	5	....	.....	1	2	8	28.6
Total	a	93	1895.6	114	28.2	89	5.7	111	8.2	86	21	208.5	14	19.5	114	19.9
	b	9	1904.2	15	465.8	12	441.2	15	408.1	12	3	52.0	0	0.0	15	59.1

PLAINS.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Adams	a	2	1880	2	40	2	6.5	....	.....	0	....	.....	....	.....	2	33.5
	b	3	1889	3	335	....	.....	3	325	0	....	.....	....	.....	3	10
Arapahoe	a	6	1909	9	42.8	6	18.3	9	14.1	6	....	.....	....	.....	9	28.7
	b	3	1908	3	118.3	3	21.7	3	21.7	3	....	.....	....	.....	3	96.7
Baca	a	2	1903	3	25.7	3	3.7	2	2.2	2	....	.....	1	0.5	3	22.2
	b	11	1905	11	131.4	11	34.3	10	30.7	10	....	.....	....	.....	11	97.1
Bent	a	3	1898	3	24.3	3	11.3	3	15.7	3	2	13	....	.....	3	8.7
	b	4	1905	6	254.2	5	85	6	80.8	5	1	20	....	.....	6	173.3
Cheyenne	a	9	1907	11	28.7	9	5.6	11	4.8	9	....	.....	1	1	11	23.9
	b	3	1903	4	179	3	12.7	4	22	3	....	.....	....	.....	4	157
Douglas	a	3	1887	3	27.3	3	6	3	6	3	....	.....	....	.....	3	21.3
Elbert	a	9	1900	11	24	9	7.8	10	7.2	8	1	1.5	....	.....	11	16.7
	b	2	1909	2	112.5	2	30.5	2	30.5	2	....	.....	....	.....	2	82
El Paso	a	5	1908	9	32	6	3.3	9	3.3	6	1	1	....	.....	9	28.6
	b		.....	2	190	....	.....	2	27	0	....	.....	....	.....	2	163
Kiowa	a	7	1897	7	39.7	6	5.5	7	7	6	3	10	....	.....	7	32.7
	b	8	1908	8	112.2	7	10.4	8	21.5	7	....	.....	1	1	8	90.7
Kit Carson	b	21	1904	25	149.3	19	24	24	12.4	18	1	4	3	216	25	137
Lincoln	b	14	1907	17	37.9	10	3.2	17	3.4	10	....	.....	3	4	17	34.4
Logan	a	2	1901	5	26.4	5	2.5	5	3.5	5	3	5	....	.....	5	22.9
	b	4	1904	7	228.1	7	46.2	4	5.9	4	....	.....	....	.....	7	181.9
Morgan	a	6	1902	6	28	4	10	6	11.2	4	....	.....	....	.....	6	16.8
	b	4	1904	4	81.2	....	.....	4	63.2	0	....	.....	....	.....	4	18
Otero	a	8	1904	13	27.9	10	4.9	12	7.1	9	3	9	....	.....	13	21
	b		.....	1	800	1	800	1	800	1	....	.....	....	.....	1	0
Phillips	b	7	1902	7	192	4	11.7	7	11.7	4	....	.....	....	.....	7	180.3
Prowers	a	1	1900	3	30.7	1	5	3	5.7	1	....	.....	....	.....	3	25
	b	14	1904	14	284.9	14	152.5	14	152.9	14	1	5	....	.....	14	132
Pueblo	a	7	1904	11	21.2	6	4	11	4	6	1	3	....	.....	11	17.2
	b		.....	1	900	1	900	1	900	1	....	.....	....	.....	1	0
Sedgwick	b	1	1890	3	100	3	63.3	3	63.3	3	....	.....	....	.....	3	236.7
Washington	a	9	1901	11	37.1	7	8	11	7.1	7	2	6.5	1	1	11	30
	b	8	1907	10	130	5	3.6	10	6.5	5	....	.....	2	1	10	123.5
Weld	a	16	1905	24	30.4	15	9.5	23	9.2	14	1	1	2	4	24	21.2
	b	8	1902	12	145.4	4	28	12	60.9	4	....	.....	....	.....	12	84.5
Yuma	a	6	1899	6	54.8	6	11.8	6	11.3	6	....	.....	2	3	6	43.5
	b	8	1901	8	170	7	13.1	8	11.5	7	....	.....	5	8	8	158.5
Total	a	101	1902.2	137	31.4	101	7.5	131	7.6	95	17	50.0	7	9.5	137	23.9
	b	123	1904.4	148	170.2	106	58.0	143	54.8	101	3	29.0	14	230.0	148	112.8
State total	a	194	1899.0	251	30.0	190	6.7	242	7.9	181	38	258.5	21	29.0	251	22.1
	b	132	1904.4	163	197.4	118	96.9	158	88.4	113	6	81.0	14	230.0	163	109.4
Aggregate		326	1901.2	414	.....	308	.....	400	.....	294	44	339.5	35	259.0	414	56.4

COLORADO—Continued.

PROPORTIONATE DEPTHS—MOUNTAIN.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Boulder	2	....	4	1	1	....	6	Larimer	4	7	4	....	1	....	12
Chaffee	2	2	1	....	....	....	3	Las Animas	3	2	7	....	....	....	9
Conejos	3	5	....	1	1	....	7	Mesa	2	1	1	....	....	....	2
Costilla	1	1	....	....	....	....	1	Montezuma	1	....	1	....	....	....	1
Custer	1	1	....	....	....	....	1	Montrose	4	2	5	....	....	1	8
Delta	1	2	....	....	....	....	2	Routt	4	4	6	1	....	....	11
Fremont	2	1	2	2	....	....	5	Saguache	3	10	2	....	....	....	12
Garfield	3	1	2	3	3	....	9	San Miguel	1	1	....	....	....	....	1
Grand	5	3	6	1	....	....	10	Teller	4	1	5	....	2	....	8
Gunnison	3	....	6	1	....	....	7								
Jackson	1	....	2	....	....	....	2	22 counties	56	46	58	13	9	3	129
Jefferson	1	1	1	....	....	1	3	Per cent	....	35.7	44.9	10.1	7.0	2.3	...
La Plata	5	1	3	3	1	1	9								

PROPORTIONATE DEPTHS—PLAINS.

Adams	1	1	3	1	....	....	5	Morgan	4	4	4	2	....	....	10
Arapahoe	3	1	5	3	2	1	12	Otero	4	4	8	2	....	....	14
Baca	5	....	4	....	6	4	14	Phillips	3	....	....	....	....	7	7
Bent	3	1	3	....	1	4	9	Prowers	5	1	2	3	2	9	17
Cheyenne	4	1	9	1	1	3	15	Pueblo	6	3	8	1	....	....	12
Douglas	2	1	2	....	....	....	3	Sedgwick	1	....	....	....	....	3	3
Elbert	5	2	8	2	....	1	13	Washington	6	1	5	5	5	5	21
El Paso	4	2	2	4	1	2	11	Weld	11	3	21	5	4	3	36
Kiowa	5	....	3	8	3	1	15	Yuma	5	....	3	1	4	6	14
Kit Carson	8	....	....	1	7	17	25								
Lincoln	4	2	6	6	3	....	17	21 counties	93	27	100	46	39	73	285
Logan	4	....	4	1	....	7	12	Per cent	....	9.5	35.1	16.1	13.7	25.6	...

Reporters' remarks:

Boulder County: "Water raised with irrigation." Chaffee County: "Rise due to irrigation." Costilla County: "The water level has risen from 10 to 20 feet, till much of the land needs draining." Delta County: "As higher lands are irrigated lower lands become saturated." "The underground flow has risen 2 to 50 feet since irrigation began." Jackson County: Streams and springs are "far more numerous since irrigation began." Jefferson County: "Water in wells is increasing on account of irrigation." Larimer County: "The water has risen fully 10 feet in the last 10 years, caused by irrigation ditches, reservoirs, etc." "Irrigation and cultivation have filled the soil with water." "The underflow of water seems to be gradually rising." Las Animas County: "The water stands the same as 30 years ago." Adams County: "Surface wells abandoned; did not vary in depth like wells in rainy country." Arapahoe County: "A constant underground flow; enough to irrigate large tracts of land." "Some wells can not be pumped dry." Baca County: "Water stays about the same level in wells." "Wells have abundant supply; depth according to elevation of land; springs and wells have not failed, if anything get stronger." "One spring has gone dry." Cheyenne County: "Water in the wells seems to stay about the same all the time." Douglas County: "All wells permanent; none have failed." "Water supplied by springs which did not show any signs of failing even in the dry year of 1880, when the creeks dried up." Elbert County: "In a dry creek water began to seep out of the banks in 1909; creek now running water; cultivated land is moist down to sheet water; uncultivated land dry to sheet water; prairie soil very compact, draining off rapidly; plowed land takes up and stores rain; cultivation has much to do with raising underflow." Kiowa County: "Only variation is when the land around has been in cultivation some time, then water rises in wells; all wells seem to have water rising and getting better." Kit Carson County: "One well has furnished water for 1,000 head of stock; no limit to the water supply; it seems to be an underground current."

"Wells are shallow along streams and the farther away the deeper until the divide is reached." "We have what they call sheet water, which does not seem to change." "Difference in depth of water is about as the land varies." "Pumped 18 gallons per minute day and night for 21 days and seemed to have plenty left." Lincoln County: About 10 per cent of the wells have failed; people compelled to make new wells." Logan County: "Water sometimes in veins, elsewhere more in sheets at uniform level." "No perceptible variation in wells; wells put down 20 years ago have not changed in water level." Morgan County: "Land underlain with inexhaustible supply of water." "Wells have an inexhaustible supply; sheet water." Otero County: "Used for irrigation, using 4-inch centrifugal pump; flow is stronger as used; so with quite a number of wells." Prowers County: "No change in depth of water in 33 years." "An irrigated country, so the water table is gradually rising and the water getting poorer." "Subartesian wells drilled in Dakota sandstone, with pure, soft water." Washington County: "We have sheet water in gravel; it does not rise to any great depth in wells, neither does continued use lower it." Weld County: "The underflow keeps the water at the same depth in wells." "Springs have run the same for 40 years." "Water varies according to elevation of the lands."

The reporters' observations on wells in the State bring out clearly the facts (1) that in irrigated valleys, especially in Mountain Colorado, the ground level of water is rising, and (2) that throughout most of Plains Colorado the ground level of water is notably stable, is not perceptibly lowered by pumping, and has not changed since settlement (except that the local water level is sometimes raised by such cultivation as serves to retain storm waters), the stable or permanent supply being widely known as sheet water.

CONNECTICUT.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Fairfield	*a* 6	1820	6	22.8	6	5.2	6	3.9	6	....	.....	3	8	6	18.9
	b 2	1908	3	153.3	3	88.3	3	86.7	3	....	.....	1	5	3	66.7
Hartford	*a* 5	1830	8	24	7	3.9	8	1.7	7	....	.....	7	15.5	8	22.3
	b 2	1905	2	177.5	2	177.5	2	177.5	2	....	.....	....	.....	2	0
Litchfield	*a* 3	1833	3	26.7	1	20	2	14	0	....	.....	....	.....	3	6.7
Middlesex	*a* 2	1802	5	17.2	3	7.3	5	3.8	3	....	.....	1	10	5	13.4
New London	*a* 10	1813	14	20.9	5	5.6	14	4.5	5	....	.....	5	13	14	16.4
Windham	*a*	.....	2	23	2	4.5	2	2.5	2	....	.....	2	4	2	20.5
Total	*a* 26	1819.4	38	21.9	24	5.7	37	4.1	23	0	0.0	18	50.5	38	17.1
	b 4	1906.7	5	163.0	5	124.0	5	123.0	5	0	0.0	1	5.0	5	40.0
Aggregate	30	1831.1	43	.....	29	.....	42	.....	28	0	0.0	19	55.5	43	19.7

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	E.	Total.	County.	Cor.	A.	B.	C.	E.	Total.
Fairfield	3	2	4	2	1	9	Windham	1	.....	2	.....	.....	2
Hartford	5	3	6	1	.....	10							
Litchfield	1	3	.....	.....	.....	3	6 counties	17	12	25	5	1	43
Middlesex	2	3	1	1	.....	5	Per cent	....	27.9	58.2	11.6	2.3	....
New London	5	1	12	1	.....	14							

Remarks by reporters:

Fairfield County: "Nearly 75 per cent of the wells are dry, owing to extreme drought." Hartford County: "There has been a marked diminution of the water supply in streams." "Our water supply grows less each year." New London County: "Wells just as they have been for sixty-odd years." "Wells do not hold out as they used to, owing to cutting off so much timber." "No perceptible change for many years." Windham County: "Springs and wells once counted permanent are now dry; the condition has been growing more serious for the past 3 years."

DELAWARE.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Kent	*a* 13	1893	23	30.9	12	14.7	23	11	12	....	.....	5	9	23	19.9
	b 1	1910	3	190.7	1	167	2	200	0	....	.....	....	.....	3	1.7
Newcastle	*a* 11	1872	24	30.1	16	8	23	6.3	15	....	.....	10	31	24	23.7
	b 1	1895	2	165	2	116	1	12	1	....	.....	....	.....	2	49
Sussex	*a* 12	1876	28	23.7	18	7.3	25	7.8	15	....	.....	5	10	28	16
	b 1	1890	4	86.7	1	60	4	45.5	1	....	.....	....	.....	4	41.2
Total	*a* 36	1881.1	75	28.0	46	9.5	71	8.3	42	0	0.0	20	50.0	75	19.6
	b 3	1898.3	9	138.8	4	114.7	7	84.9	2	0	0.0	0	0.0	9	29.6
Aggregate	39	1882.3	84	.....	50	.....	78	.....	44	0	0.0	20	50.0	84	20.7

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.
Kent	8	4	20	2	....	....	26
Newcastle	10	2	18	4	2	....	26
Sussex	10	4	23	5	....	....	32
3 counties	28	10	61	11	2	....	84
Per cent	....	11.9	72.6	13.1	2.4	....	....

Reporters' remarks:

Newcastle County: "The water level has sunk 3 feet in 20 years." "Do not note any special difference in springs during the past 30 years; no woodland has been cleared up within 1 mile or more." Sussex County: "No appreciable variation in 40 years." "Not much variation in depth of wells since I have lived; I am 73 years old."

These remarks are notably harmonious with the records for the State taken as a whole and with the mean rate of lowering of the water level indicated by the figures, the absolute lowering ranging from 6 feet each in two wells down to no observed change in a majority of the wells of the State.

FLORIDA.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Alachua	*a* 1	1903	3	23.7	1	6	3	3.7	1	....	.....	....	.....	3	20
	b 5	1902	5	84	5	45	5	43.6	5	....	.....	2	7	5	40.4
Baker	*a* 3	1896	8	28.2	3	4	8	4.4	3	....	.....	1	2	8	23.9
Bradford	*a* 4	1895	5	28.8	3	6.7	5	7.6	3	3	8	....	.....	5	21.2
Brevard	*a* 5	1894	7	14.9	3	6.8	5	4.4	2	....	.....	2	4.5	7	10.3
	b 3	1903	4	216.2	4	216.2	2	182.5	2	....	.....	....	.....	4	0
Calhoun	*a* 6	1902	9	26.7	5	3.9	6	3.7	2	....	.....	....	.....	9	22.7
Clay	*a* 3	1906	3	34.7	3	11	3	13.3	3	3	7	....	.....	3	21.3
Columbia	*a* 4	1875	6	17.7	4	7.2	6	6.8	4	2	2	2	14	6	10.8
	b	.....	1	133	....	.....	1	121	0	....	.....	....	.....	1	12
Dade	*a* 2	1908	6	21	4	7.5	6	6	4	1	1	3	7	6	15
De Soto	*a* 8	1897	10	11.4	8	4.5	10	4.5	8	1	4	1	3	10	6.9
Duval	*a* 9	1902	11	29.8	6	29.6	10	16.7	5	....	.....	....	.....	11	9.3
Escambia	*a* 4	1898	4	44	4	4.2	4	4.2	4	....	.....	....	.....	4	39.8
	b 2	1907	2	80.5	2	16	2	13	2	....	.....	1	6	2	67.5
Gadsden	*a* 6	1877	6	33.7	3	5	6	10.2	3	....	.....	....	.....	6	23.4
Hamilton	*a* 5	1887	6	21.2	5	4.4	6	7.2	5	4	13	1	1	6	14
	b 2	1901	2	88.5	2	35	2	30	2	....	.....	1	10	2	58.5
Hillsboro	*a* 6	1897	6	15.5	3	6.3	6	6.2	3	....	.....	1	6	6	9.3
	b 5	1910	5	209.8	5	209.8	....	.....	0	....	.....	....	.....	5	0
Holmes	*a* 8	1896	8	31.2	5	13.8	8	5.3	5	....	.....	5	48.5	8	25.9
Jackson	*a* 4	1876	7	42	7	6.8	7	5.4	7	1	4	6	13.5	7	36.6
Jefferson	*a* 2	1880	3	40	1	9	3	9	1	....	.....	....	.....	3	31
Lake	*a* 10	1894	10	27.6	10	5.2	10	5.8	10	4	8	3	2	10	21.8
	b 1	1908	5	149	1	25	4	164.2	0	....	.....	....	.....	5	12.6
Lee	*a* 6	1902	10	13.2	4	3	9	5.7	3	3	6	....	.....	10	7.9
	b 2	1908	3	145.5	....	.....	3	145.5	0	....	.....	....	.....	3	0
Leon	*a* 1	1906	3	30	3	6	3	8	3	3	6	....	.....	3	22
Levy	*a* 3	1901	3	46.7	3	13.3	3	8	3	....	.....	3	16	3	38.7
Liberty	*a* 4	1900	6	24.7	5	10.6	5	7	4	....	.....	2	8	6	16.3
Madison	*a*	.....	3	56.7	3	8	3	0	3	....	.....	3	24	3	56.7
	b	.....	2	75	....	.....	2	20	0	....	.....	....	.....	2	55
Manatee	*a* 5	1892	5	9.2	3	3	5	3.4	3	....	.....	....	.....	5	5.8
	b	.....	3	60	3	60	3	60	3	....	.....	....	.....	3	0
Marion	*a* 11	1888	17	36.2	15	7.5	16	8.7	14	4	17	3	8	17	27.8
	b 6	1904	6	75	4	28.2	3	27.3	1	....	.....	1	10	6	49.2
Nassau	*a*	.....	5	14.6	....	.....	5	4	0	....	.....	....	.....	5	10.6
Orange	*a* 4	1901	4	28.7	4	10	2	4.5	2	1	1	1	6	4	20
	b 1	1909	4	207.5	2	87.5	3	223.3	1	....	.....	....	.....	4	21.2
Osceola	*a*	.....	3	14.7	2	4.7	3	3	2	....	.....	2	2.5	3	11.7
	b 1	1907	4	228.5	4	219	4	218.5	4	....	.....	1	2	4	10
Palm Beach	*a* 11	1897	14	26.9	6	4.2	13	8	5	1	2	....	.....	14	19.1
Pasco	*a* 13	1886	14	28.3	12	9.5	11	12.3	9	7	9.5	....	.....	14	16.9
	b 1	1898	2	237.5	1	150	1	120	0	....	.....	....	.....	2	102.5
Polk	*a* 6	1905	8	25.7	6	7.3	7	8.6	5	....	.....	3	2	8	17.5
Putnam	*a* 4	1900	9	31.2	7	5.1	7	9.7	5	....	.....	4	10	9	22.7
	b 4	1895	4	202.7	1	94	8	230.3	0	....	.....	....	.....	4	6.5
St. John	*a* 3	1883	3	19	3	5.7	....	.....	0	....	.....	....	.....	3	13.3
	b	.....	1	300	1	300	....	.....	0	....	.....	....	.....	1	0
St. Lucie	*a* 9	1900	17	19.5	5	4.6	17	7	5	....	.....	....	.....	17	12.5
	b	.....	4	389.7	....	.....	4	389.7	0	....	.....	....	.....	4	0
Santa Rosa	*a* 7	1899	8	24.6	4	5	8	5.8	4	....	.....	....	.....	8	18.7
Suwanee	*a*	.....	2	10.5	2	3.5	....	.....	0	....	.....	....	.....	2	7
	b 5	1906	5	98.6	5	62	....	.....	0	....	.....	....	.....	5	36.6
Taylor	*a* 3	1904	3	10.7	3	3	2	6	2	2	6	....	.....	3	5.7
Volusia	*a* 1	1895	4	14.7	1	3	4	6.7	1	....	.....	1	2	4	8
	b 7	1900	11	162.6	6	196.2	10	154.7	5	....	.....	....	.....	11	6.1
Wakulla	*a* 6	1902	6	19.8	6	2.9	6	5.3	6	6	14.5	....	.....	6	14.5
Walton	*a* 3	1890	3	24.3	3	5.3	3	6.7	3	1	4	....	.....	3	17.7
Washington	*a* 3	1904	4	13.5	....	.....	4	5	0	....	.....	....	.....	4	8.5
Total	*a* 193	1894.6	272	25.8	178	7.2	248	7.1	155	47	113.0	47	180.0	272	18.1
	b 45	1903.5	73	163.5	46	122.6	52	147.0	25	0	0.0	6	35.0	73	21.1
Aggregate	238	1896.3	345	.....	224	.....	300	.....	180	47	113.0	53	215.0	345	18.7

FLORIDA—Continued.

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Alachua	4	1	2	5	....	....	8	Madison	1	....	....	5	....	....	5
Baker	3	3	2	3	....	....	8	Manatee	3	8	....	....	....	....	8
Bradford	2	2	2	....	1	....	5	Marion	7	1	9	12	1	....	23
Brevard	5	7	4	....	....	....	11	Nassau	1	2	3	....	....	....	5
Calhoun	3	4	2	2	1	....	9	Orange	2	....	8	....	....	....	8
Clay	1	1	1	1	....	....	3	Osceola	2	2	5	....	....	....	7
Columbia	2	3	3	1	....	....	7	Palm Beach	5	4	6	4	....	....	14
Dade	4	3	2	1	....	....	6	Pasco	6	2	11	2	....	1	16
De Soto	3	8	2	....	....	....	10	Polk	3	1	7	....	....	....	8
Duval	4	4	7	....	....	....	11	Putnam	5	3	10	....	....	....	13
Escambia	2	....	1	2	3	....	6	St. John	1	2	2	....	....	....	4
Gadsden	2	2	1	3	....	....	6	St. Lucie	7	13	8	....	....	....	21
Hamilton	3	1	5	2	....	....	8	Santa Rosa	3	2	6	....	....	....	8
Hillsboro	4	8	3	....	....	....	11	Suwanee	2	1	4	2	....	....	7
Holmes	3	....	6	2	....	....	8	Taylor	1	3	....	....	....	....	3
Jackson	3	....	3	3	1	....	7	Volusia	4	12	2	1	....	....	15
Jefferson	1	....	2	1	....	....	3	Wakulla	2	2	3	1	....	....	6
Lake	4	3	10	2	....	....	15	Walton	1	....	3	....	....	....	3
Lee	5	9	4	....	....	....	13	Washington	2	1	3	....	....	....	4
Leon	1	....	3	....	....	....	3								
Levy	1	....	....	3	....	....	3	41 counties	120	121	157	59	7	1	345
Liberty	2	3	2	1	....	....	6	Per cent	....	35.1	45.5	17.1	2.0	0.3	....

Remarks of reporters:

Alachua County: "Water level has not made any perceptible change." "No change in water level; a large number of drilled wells, and the water is not lowered perceptibly by pumping." Dade County: "Water in wells has fallen 3 feet since the Everglade drainage began." Jackson County: "Several wells abandoned on account of failure of water; one spring has failed." Liberty County: "Three wells have been abandoned for lack of water and about 8 springs have failed." Orange County: "Water does not seem to be so near the surface as in former years." Osceola County: "The dug wells are slightly lower, probably 1 to 1½ feet." Putnam County: "Wells have been deepened repeatedly." Suwanee County: "Surface wells go dry in very dry weather." Volusia County: "Water is about 2 feet lower than it was 15 years ago." Wakulla County: "The downpour of rains of late accounts for the wells being so full."

GEORGIA.

LOWLAND.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Appling	*a* 3	1893	10	19.2	3	5.7	10	4.4	3	3	4	....	....	10	14.8
Baker	*a* 1	1908	5	38.8	3	26	5	16.4	3	....	....	3	10	5	22.4
	b 1	1909	3	95	3	62.7	3	53	3	....	....	3	29	3	42
Ben Hill	*a* 3	1907	3	14.3	3	7.3	3	6	3	....	....	1	4	3	8.3
Berrien	*a* 5	1886	11	28.7	7	14.7	10	8.8	6	....	....	3	22	11	19.1
Brooks	*a* 7	1875	15	39.2	6	11.2	15	8.8	6	....	....	2	16	15	30.4
	b 4	1905	4	214.5	4	130.5	3	100.7	3	....	....	....	....	4	84
Bryan	*a* 1	1900	4	19	3	10	4	10.5	3	....	....	....	....	4	8.5
Bulloch	*a* 6	1893	10	29.3	8	8.3	10	8.1	8	....	....	4	10.5	10	21.2
Burke	*a* 3	1872	3	80	3	4.3	3	4.3	3	....	....	....	....	3	75.7
Calhoun	*a* 2	1895	2	35	2	9	2	2.5	2	....	....	2	13	2	32.5
Camden	*a* 4	1870	4	14.5	4	5.2	1	5	1	....	....	....	....	4	9.2
	b 1	1905	4	297.5	4	297.5	4	297.5	4	....	....	....	....	4	0
Clinch	*a*	....	4	25.8	2	4.5	4	4.2	2	....	....	....	....	4	21.5
Coffee	*a* 4	1894	8	24.1	6	7.7	8	7.7	6	1	3	4	8	8	16.4
Colquitt	*a* 2	1908	5	30	4	13	4	11	3	....	....	2	8	5	18.2
	b 2	1909	2	375	2	180	1	210	1	....	....	....	....	2	195
Decatur	*a* 6	1887	14	41.4	11	5.8	13	3.9	10	3	4	6	12	14	36.2
Dodge	*a* 2	1899	3	28	3	7.3	3	7	3	....	....	1	1	3	21

GEORGIA—Continued.

LOWLAND—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Dooly	a	4	1871	13	44.5	7	10	13	7.1	7			7	31	13	37.5
	b	1	1890	3	527.3	1	10	3	422	1			1	8	3	105.3
Dougherty	a			2	60			2	4	0					2	56
	b	3	1893	3	228.3	3	180.3	3	180.3	3					3	48
Early	a	2	1902	2	40.5	2	20.5	2	20.5	2					2	20
	b	1	1883	1	225	1	218	1	218	1					1	7
Effingham	a			4	16			4	5.5	0					4	10.5
Emanuel	a			2	45			2	15	0					2	30
	b			1	300			1	170	0					1	130
Glynn	a			2	17	2	13.5	2	13	2	1	2	1	3	2	4
Houston	a	4	1870	11	48.4	9	5.1	11	3.9	9			7	16	11	44.5
Irwin	a			1	29	1	4			0					1	25
Jeff Davis	a	3	1901	3	30	3	4.3	3	4.3	3					3	25.7
Jefferson	a	4	1895	7	36.4	4	3.7	7	4.4	4	3	3			7	32
	b			2	412.5			2	412.5	0					2	0
Jenkins	a			2	34.2			2	12.5	0					2	21.7
Johnson	a			2	30			2	5	0					2	25
Laurens	a			3	35			3	8.3	0					3	26.7
Lee	a	3	1904	3	28.7	3	15	3	8.3	3			3	20	3	20.3
Liberty	a	4	1889	4	16.7	4	5.7	4	4	4			1	7	4	12.7
Lowndes	a	4	1891	7	29	4	4.6	7	4.7	4	2	7			7	24.3
Macon	a	2	1875	4	46.5	4	6.4	4	3.2	4			4	12.5	4	43.2
McIntosh	a			3	16.3	3	12	3	13	3	3	3			3	3.3
Miller	b	1	1908	1	160			1	60	0					1	100
Mitchell	a	1	1910	6	36	5	6.8	6	3.3	5			5	20	6	32.7
	b			4	181.2			4	133.7	0					4	47.5
Pulaski	a	7	1877	7	31.1	7	8.9	7	7.6	7			3	9	7	23.6
Quitman	a			1	19	1	4	1	4	1					1	15
Randolph	a	5	1888	6	43.3	3	3.3	6	4.2	3					6	39.2
	b			1	190			1	85	0					1	105
Richmond	a	3	1899	3	88.3	3	5.7	3	2.3	3			3	10	3	86
Schley	a	5	1886	5	51	5	10	5	7.6	5			3	12	5	43.4
	b	1	1909	1	650			1	490	0					1	160
Screven	a	3	1888	5	25.8	5	3.8	5	3	5			4	4	5	22.8
Stewart	a	7	1890	9	48.4	8	6.1	8	3.5	7			6	19.5	9	45
	b			2	450			2	450	0					2	0
Sumter	a	3	1894	3	63.3	3	9	3	7.7	3			2	4	3	55.7
Tattnall	a	4	1869	7	24.1	6	10	7	5	6			6	27	7	19.1
Taylor	a	3	1891	3	72.3	3	3	3	0.2	3			3	8.5	3	72.2
Telfair	a	6	1897	6	24.8	6	4.3	6	2.4	6			4	11.5	6	22.4
Terrell	a	3	1899	7	43.1	5	11.6	5	7	3			3	14	7	36
	b	2	1900	5	329.6	2	357.5	5	285	2			1	70	5	44.6
Thomas	a	5	1884	8	36	6	6.3	8	4.2	6			5	11	8	31.7
Tift	a	2	1890	3	33	2	17	3	15.7	2	1	2	1	9	3	17.3
Toombs	a	3	1901	3	27.3	3	8	3	4.7	3			3	10	3	22.7
Ware	a	3	1907	9	21.1	3	9.3	9	9.2	3	3	14			9	11.9
Wayne	a	6	1890	10	20.6	7	7.5	10	10.3	7	7	20.5			10	10.3
Webster	a	3	1876	3	37	3	5	3	4.7	3			1	1	3	32.3
Wilcox	a	11	1884	14	39.1	12	6.2	14	7.9	12	4	7	6	24	14	31.2
Wilkinson	a	3	1882	7	48.9	6	4.3	7	3.6	6			3	5.5	7	45.2
Worth	a	2	1822	7	29	4	7.2	6	4.8	3			1	3	7	23.1
	b	1	1906	4	182.5	1	100	4	150	1					4	32.5
Total	a	167	1887.3	308	35.0	220	7.9	297	6.6	209	31	69.5	113	397.0	308	28.3
	b	18	1901.7	41	285.4	21	183.0	39	230.2	19	0	0.0	5	107.0	41	57.5

UPLAND.

Baldwin	a			6	40.5			6	3.6	0					6	36.9
Banks	a	6	1853	6	55.8	6	5.7	6	5.3	6			3	2.5	6	50.5
Bartow	a	5	1864	13	55.2	10	9.2	13	6.6	10			8	28	13	48.6
Bibb	a	4	1884	10	43.2	3	5.7	10	4.8	3	1	1	2	6	10	38.4
	b			2	90	1	60	1	40	0					2	40
Butts	a			1	30	1	6	1	6	1					1	24
Campbell	a	6	1897	7	26.9	7	4.4	7	3.6	7	1	0.5	4	5.5	7	23.2
Carroll	a	6	1869	12	45.4	10	7.8	12	6	10			5	13	12	39.4
Catoosa	a	3	1867	3	33	3	4.7	3	3.7	3			2	3	3	29.3
Chattooga	a	10	1865	12	39.3	10	7.7	12	6.8	10	1	2	3	9	12	32.5
Cherokee	a	14	1876	19	45.5	13	6.4	19	4.6	13			8	25.5	19	41
Clayton	a	4	1873	9	44.7	7	4.9	9	4.7	7			4	7	9	40
Cobb	a	4	1870	7	34.3	4	5.2	7	4.3	4			2	3	7	30
Coweta	a	1	1880	2	42.5	2	7	2	7	2					2	35.5
Crawford	a	3	1897	3	33.7	3	3.3	3	2.5	3			3	2.5	3	31.2
Dade	a	3	1889	3	41.7	3	3.3	3	2.3	3			3	3	3	39.3

GEORGIA—Continued.

UPLAND—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Dekalb	*a* 3	1863	6	33.8	5	6.2	6	5.3	5	....	.....	3	7	6	28.5
Douglas	*a* 6	1870	6	44.2	6	5.8	6	4.3	6	....	.....	3	8	6	39.8
Elbert	*a* 3	1890	7	46.9	3	3.3	7	4.9	3	1	0.5	1	0.5	7	42
Fannin	*a* 6	1903	7	35.4	5	9.8	7	7.7	5	....	.....	2	2	7	27.7
Fayette	*a* 1	1895	5	36.2	3	4	5	3.6	3	....	.....	3	3	5	32.6
Floyd	*a* 8	1879	11	34.9	11	5.5	11	4.2	11	1	1	7	15.5	11	30.7
Franklin	*a* 6	1889	8	38.5	6	4.5	8	3.3	6	....	.....	3	10.5	8	35.2
Fulton	*a* 4	1896	6	31.7	5	4	6	3.2	5	....	.....	4	7.5	6	28.4
Gilmer	*a* 8	1893	16	52.2	13	7.1	16	7.2	13	....	.....	7	13	16	45.1
Gordon	*a* 3	1861	4	48.5	4	7	4	5.5	4	....	.....	2	6	4	43
Greene	*a* 8	1881	10	48.7	4	4.9	10	5.1	4	....	.....	3	4	10	43.5
Gwinnett	*a* 12	1876	18	39.5	16	6.2	18	5.2	16	4	6.5	8	25	18	34.3
Habersham	*a* 3	1870	8	53.1	6	6.2	8	4.7	6	....	.....	5	12.5	8	48.4
Hall	*a* 3	1846	6	59.2	4	7	6	6.8	4	2	5	2	5	6	52.3
Hancock	*a* 3	1880	3	46.7	3	5	3	4.3	3	....	.....	2	2	3	42.3
Haralson	*a* 3	1868	4	50	3	7.3	4	6.5	3	....	.....	2	3	4	43.5
Hart	*a* 3	1873	3	41.7	3	2.7	3	1	3	....	.....	2	5	3	40.7
Heard	*a* 6	1889	11	35.3	9	5.6	11	4	9	....	.....	8	13.5	11	31.2
Henry	*a* 3	1897	3	57.3	3	3.5	3	1.5	3	....	.....	3	6	3	55.8
Jackson	*a* 7	1880	10	42.3	9	5.8	9	3.8	8	....	.....	3	11	10	37.9
Jasper	*a* 3	1881	4	53	3	10.3	4	8	3	....	.....	2	4	4	45
Jones	*a* 6	1893	11	45.6	8	6.2	11	6	8	....	.....	3	4.5	11	39.7
Lincoln	*a* 5	1877	5	44	5	6.8	5	5.8	5	....	.....	2	5	5	38.2
Lumpkin	*a* 7	1898	8	54.7	6	5.6	8	5.1	6	....	.....	4	6	8	49.7
McDuffie	*a*	.....	4	41.7	2	3.5	4	4.6	2	....	.....	2	1.5	4	37.1
Meriwether	*a* 7	1875	9	29.2	6	9.8	9	6.1	6	....	.....	4	18	9	23.1
Milton	*a* 5	1856	5	51	5	6.8	5	5.4	5	....	.....	3	7	5	45.6
Monroe	*a* 17	1880	17	42.7	17	5.2	17	3.6	17	1	0.5	11	27	17	39.1
Morgan	*a* 4	1862	5	31.2	1	12	4	7.4	0	....	.....	....	.....	5	21.4
Murray	*a* 3	1906	3	58	....	.....	3	31.3	0	....	.....	....	.....	3	26.7
Muscogee	*a* 6	1898	6	31	6	6.5	6	6	6	....	.....	3	3	6	25
Newton	*a* 9	1884	9	38.3	9	9.6	6	7.5	6	....	.....	1	4	9	29.2
Oconee	*a* 5	1891	6	44.7	6	8.3	6	6.3	6	....	.....	4	12	6	38.3
Oglethorpe	*a* 3	1867	3	40	3	4	3	3.5	3	....	.....	2	1.5	3	36.5
Paulding	*a*	.....	3	45.3	3	5.5	3	3.5	3	....	.....	3	6	3	41.8
Pickens	*a* 4	1892	8	46.5	7	6.6	8	6	7	3	5	2	9	8	40.5
Pike	*a* 3	1898	3	41.7	3	4.7	3	1.3	3	....	.....	3	10	3	40.3
Polk	*a* 6	1893	6	31.7	6	16.5	6	7.7	6	....	.....	3	53	6	24
Putnam	*a* 9	1898	9	50.3	9	5.4	9	3.2	9	....	.....	6	20.5	9	47.2
Rabun	*a* 2	1867	2	45	2	8.5	....	.....	0	....	.....	....	.....	2	36.5
Spalding	*a* 9	1892	9	29.2	9	5.7	9	4.2	9	....	.....	6	14	9	25.1
Stephens	*a* 6	1891	6	45.2	6	4.5	6	3.9	6	....	.....	4	3.5	6	41.2
Talbot	*a*	.....	2	50	2	5.5	....	.....	0	....	.....	....	.....	2	44.5
Troup	*a* 6	1875	6	38.8	6	7.2	6	5.3	6	....	.....	2	11	6	33.5
Union	*a* 1	1891	3	44.7	3	6.3	3	5	3	....	.....	2	4	3	39.7
Upson	*a* 3	1882	3	33.3	3	8.7	1	6	1	....	.....	....	.....	3	24.7
Walker	*a* 4	1869	9	32.4	4	5.1	9	4.8	4	....	.....	2	4.5	9	27.6
	b 3	1906	4	90.2	3	50.7	4	48	3	....	.....	....	.....	4	42.2
Walton	*a* 3	1865	3	43.3	3	6.5	3	5	3	....	.....	3	4.5	3	38.3
Warren	*a* 1	1870	3	30	3	6	3	4	3	....	.....	3	6	3	26
Washington	*a* 6	1852	7	35.9	7	17.3	7	9.9	7	....	.....	4	52	7	26
	b 1	1904	1	886	1	886	1	886	1	....	.....	....	.....	1	0
White	*a* 6	1882	8	62.5	8	5.4	8	4.1	8	....	.....	5	10	8	58.4
Whitfield	*a* 1	1860	6	21.2	6	5.2	6	4	6	....	.....	5	7	6	17.2
Wilkes	*a* 10	1878	11	50.7	11	6.2	11	5.1	11	....	.....	5	12	11	45.5
Total	*a* 328	1880.2	467	42.6	381	6.6	456	5.3	370	15	22.0	219	588.5	467	37.2
	b 4	1905.5	7	203.9	5	219.6	6	186.3	4	0	0.0	0	0.0	7	35.6
State total	*a* 495	1882.6	775	39.6	601	7.1	753	5.8	579	46	91.5	332	985.5	775	33.7
	b 22	1902.4	48	273.5	26	190.1	45	224.3	23	0	0.0	5	107.0	48	54.3
Aggregate	517	1883.5	823	.....	627	.....	798	.....	602	46	91.5	337	1,092.5	823	34.9

GEORGIA—Continued.

PROPORTIONATE DEPTHS—LOWLAND.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County	Cor.	A.	B.	C.	D.	E.	Total.
Appling	3	2	8	.....	.....	.....	10	Lowndes	3	.....	5	2	.....	.....	7
Baker	3	1	3	3	1	.....	8	Macon	1	.....	1	2	1	.....	4
Ben Hill	1	2	1	.....	.....	.....	3	McIntosh	1	3	.....	.....	.....	.....	3
Berrien	4	3	7	1	.....	.....	11	Miller	1	.....	.....	.....	1	.....	1
Brooks	4	.....	7	9	2	1	19	Mitchell	3	.....	3	6	1	.....	10
Bryan	2	3	1	.....	.....	.....	4	Pulaski	3	.....	5	2	.....	.....	7
Bulloch	4	1	8	1	.....	.....	10	Quitman	1	.....	1	.....	.....	.....	1
Burke	1	.....	.....	.....	3	.....	3	Randolph	2	.....	2	4	1	.....	7
Calhoun	1	.....	1	1	.....	.....	2	Richmond	1	.....	.....	.....	3	.....	3
Camden	3	5	3	.....	.....	.....	8	Schley	2	.....	1	3	1	1	6
Clinch	2	2	1	1	.....	.....	4	Screven	2	.....	5	.....	.....	.....	5
Coffee	3	1	7	.....	.....	.....	8	Stewart	3	2	1	6	2	.....	11
Colquitt	3	.....	5	.....	.....	2	7	Sumter	1	.....	.....	3	.....	.....	3
Decatur	3	.....	6	8	.....	.....	14	Tattnall	3	2	3	2	.....	.....	7
Dodge	1	.....	3	.....	.....	.....	3	Taylor	1	.....	.....	.....	3	.....	3
Dooly	4	1	9	2	3	1	16	Telfair	2	.....	6	.....	.....	.....	6
Dougherty	1	.....	.....	5	.....	.....	5	Terrell	5	1	5	3	3	.....	12
Early	1	1	2	.....	.....	.....	3	Thomas	4	.....	5	2	1	.....	8
Effingham	2	3	1	.....	.....	.....	4	Tift	1	1	2	.....	.....	.....	3
Emanuel	1	.....	1	1	.....	1	3	Toombs	1	.....	3	.....	.....	.....	3
Glynn	1	2	.....	.....	.....	.....	2	Ware	4	4	5	.....	.....	.....	9
Houston	4	.....	5	4	1	1	11	Wayne	4	4	6	.....	.....	.....	10
Irwin	1	.....	1	.....	.....	.....	1	Webster	1	.....	2	1	.....	.....	3
Jeff Davis	1	.....	3	.....	.....	.....	3	Wilcox	4	.....	10	2	2	.....	14
Jefferson	4	2	2	5	.....	.....	9	Wilkinson	2	.....	3	2	2	.....	7
Jenkins	1	.....	2	.....	.....	.....	2	Worth	4	.....	9	2	.....	.....	11
Johnson	1	.....	1	1	.....	.....	2								
Laurens	1	.....	3	.....	.....	.....	3	56 counties	124	47	180	84	31	7	349
Lee	1	.....	3	.....	.....	.....	3	Per cent	.....	13.5	51.6	24.0	8.9	2.0	...
Liberty	2	1	3	.....	.....	.....	4								

PROPORTIONATE DEPTHS—UPLAND.

Baldwin	1	1	3	1	1	.....	6	Jones	3	.....	3	7	1	.....	11
Banks	2	.....	.....	5	1	.....	6	Lincoln	2	.....	1	4	.....	.....	5
Bartow	5	.....	1	10	2	.....	13	Lumpkin	3	.....	1	5	2	.....	8
Bibb	4	.....	7	3	2	.....	12	McDuffie	1	.....	3	.....	1	.....	4
Butts	1	.....	1	.....	.....	.....	1	Meriwether	4	.....	8	1	.....	.....	9
Campbell	3	.....	5	2	.....	.....	7	Milton	2	.....	1	4	.....	.....	5
Carroll	5	.....	2	10	.....	.....	12	Monroe	6	.....	5	11	1	.....	17
Catoosa	1	.....	1	2	.....	.....	3	Morgan	1	.....	4	1	.....	.....	5
Chattooga	4	.....	7	5	.....	.....	12	Murray	1	.....	2	1	.....	.....	3
Cherokee	6	.....	7	6	6	.....	19	Muscogee	2	1	3	2	.....	.....	6
Clayton	3	.....	5	2	2	.....	9	Newton	3	.....	5	4	.....	.....	9
Cobb	3	.....	5	2	.....	.....	7	Oconee	2	.....	2	4	.....	.....	6
Coweta	1	.....	.....	2	.....	.....	2	Oglethorpe	1	.....	2	1	.....	.....	3
Crawford	1	.....	2	1	.....	.....	3	Paulding	1	.....	.....	3	.....	.....	3
Dade	1	.....	1	2	.....	.....	3	Pickens	3	.....	2	5	1	.....	8
Dakalb	3	.....	3	3	.....	.....	6	Pike	1	.....	1	2	.....	.....	3
Douglas	2	.....	2	3	1	.....	6	Polk	2	.....	4	2	.....	.....	6
Elbert	4	.....	4	1	2	.....	7	Putnam	3	.....	1	5	3	.....	9
Fannin	3	.....	5	2	.....	.....	7	Rabun	1	.....	1	1	.....	.....	2
Fayette	2	.....	2	3	.....	.....	5	Spalding	3	.....	8	1	.....	.....	9
Floyd	4	.....	7	3	1	.....	11	Stephens	2	.....	1	5	.....	.....	6
Franklin	3	.....	4	3	1	.....	8	Talbot	1	.....	1	.....	1	.....	2
Fulton	3	1	2	3	.....	.....	6	Troup	2	.....	2	4	.....	.....	6
Gilmer	7	.....	2	12	2	.....	16	Union	3	.....	.....	3	.....	.....	3
Gordon	2	.....	.....	4	.....	.....	4	Upson	1	.....	3	.....	.....	.....	3
Greene	4	.....	1	6	3	.....	10	Walker	4	2	6	3	2	.....	13
Gwinnett	8	.....	6	12	.....	.....	18	Walton	1	.....	1	2	.....	.....	3
Habersham	3	.....	3	2	3	.....	8	Warren	1	.....	3	.....	.....	.....	3
Hall	2	.....	.....	6	.....	.....	6	Washington	2	1	5	2	.....	.....	8
Hancock	1	.....	1	1	1	.....	3	White	3	.....	1	2	5	.....	8
Haralson	1	.....	2	1	1	.....	4	Whitfield	3	.....	6	.....	.....	.....	6
Hart	1	.....	.....	3	.....	.....	3	Wilkes	4	.....	3	6	2	.....	11
Heard	3	.....	5	6	.....	.....	11								
Henry	1	.....	.....	2	1	.....	3	68 counties	174	6	187	231	50	.....	474
Jackson	3	.....	1	9	.....	.....	10	Per cent	.....	1.3	39.5	48.7	10.5	.....	...
Jasper	1	.....	1	2	1	.....	4								

Remarks by reporters:

Berrien County: "Since the Charleston earthquake ponds have not held water like they did before." Brooks County: "The water level is lower now than at any time in the history of the country." Shallow wells vary widely in stage of water with

wet and dry seasons. Bryan County: "No wells have failed; springs running all right." Bulloch County: "Water table does not show any noticeable change in recent years." "A spring flowing 75 years has failed." Calhoun County: "Up to 20 years ago the average depth of dug wells was 25 feet, but since the ponds and flat lands have been drained the average depth is 45 feet, and a great many of the wells have gone dry." Coffee County: "Water in wells has been getting lower for the last 5 years, and springs have failed." Dooly County: "Well level is lower than it was years ago; branches fed by springs are not half the size they were 20 years since; springs are failing in places." "Surface water supply gets scarcer each year." Effingham County: "Wells do not have quite so much water as they had 10 years ago." Houston County: "Most of the wells and springs are showing a lack of water supply." Jefferson County: "Some springs have dried up since the land was cleared; some wells have been dug deeper, some have failed." Johnson County: "Water is getting low in the wells; some failing." Mitchell County: "Nearly all surface wells went dry a year ago." Stewart County: "A good many wells have failed and some give scarcely any water." "Several springs and some wells have failed." Taylor County: "Nearly all wells have either partially failed or have failed entirely." Telfair County: "Many have had to dig their wells deeper; a spring is dry for the first time." Terrell County: "The water level has a seasonal variation of 4 to 6 feet, but is slowly getting lower." "Branch heads dried up, and wells failing." Thomas County: "Some springs known for 65 years are still flowing as usual." Wilkinson County: "Two springs have failed in the last few years; a great many wells have been abandoned on account of failure to furnish water." Bibb County: "When the land is generally cleared up the wells are more liable to fail." "There were formerly many springs, but they have mostly ceased to flow." Butts County: "Many springs dry or partly dry, others too warm for drinking, caused by timber being cut around them." Cherokee County: "A spring dried when a deep well was put down." "Water supply not as good and strong as 25 years past; there are three times the land cleared and cultivated, and the blasting on public roads and in mines has sunk the water—some are forced to dig wells deeper" (recorder a resident for 65 years). Douglas County: "A fine spring has failed, one of the best in the whole country, after 50 or 60 years' use;" ascribed to draining a swamp. Fayette County: "One spring went dry, caused by cutting a ditch near-by." Franklin County: "Water changed so little it is barely perceptible." "Wells have been dug deeper." Fulton County: "Some springs entirely dry, others very low." Gwinnett County: "Farm was settled in 1818, and for 50 years water was obtained from fine springs; the springs are not very fine now." Heard County: "Some springs have sunk, on account of cultivation of the land." Henry County: "Many wells and springs that never failed before are dry now." Lumpkin County: "Wells fail at times, but could not state cause." Pike County: "All wells are scarce in water; many have been dug deeper." Putnam County: "The water level has sunk in 15 years 8 to 10 feet."

In Georgia, as pretty generally in other States east of the Plains, the reporters' remarks clearly indicate that the observed lowering of the water level exceeds that recorded in the schedules, (1) on account of wells failed and abandoned without record, and (2) by reason of repeated deepening of wells not noted in the schedules.

IDAHO.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Ada	a	7	1902	8	19.6	6	4.7	8	8.1	6	1	10	1	4	8	11.5
	b	7	1909	8	242.2	6	205	8	194.6	6	1	6	....	.....	8	47.6
Bannock	a	17	1899	20	41.8	20	7	19	6	19	5	21	7	43	20	35.8
	b	4	1908	8	137	4	17	8	17.4	4	1	10	....	.....	8	119.6
Bear Lake	a	6	1900	9	30.4	9	6.3	9	7.9	9	6	20	2	5	9	22.4
Bingham	a	13	1899	16	44.2	15	10.9	16	14.5	15	6	52	1	2	16	29.7
	b	11	1907	12	156.7	11	18.8	12	22	11	3	17	....	.....	12	134.7
Blaine	a	9	1899	10	43.5	6	16.5	10	15.9	6	3	20	....	.....	10	27.6
Boise	a		.....	2	12	2	5	2	5	2	....	.....	....	.....	2	7
Bonner	a	18	1900	19	26.8	18	6.7	19	4.5	18	....	.....	10	42	19	22.3
Canyon	a	8	1899	11	34.7	10	7.5	11	8.4	10	5	15	1	6	11	26.4
	b	14	1905	17	153.6	13	133.9	17	123.4	13	4	41	....	.....	17	30.2
Cassia	a	4	1889	6	37.3	6	12.8	6	9.5	6	3	6	3	26	6	27.8
	b	1	1906	1	113	....	.....	1	6	0	....	.....	....	.....	1	107
Custer	a	3	1893	3	37	3	2.7	3	4.8	3	3	6.5	....	.....	3	32.2
Elmore	a		.....	2	30	....	.....	2	6	0	....	.....	....	.....	2	24
Fremont	a	13	1897	22	36.3	18	11.7	22	16.9	18	15	123	2	2	22	19.4
	b	3	1905	5	104.2	3	13.3	4	46.7	2	2	90	....	.....	5	64.8
Idaho	a	7	1905	11	22.1	8	4.5	11	5.3	8	....	.....	2	7.5	11	16.8
	b	1	1909	5	295.2	2	17.5	5	26.2	2	....	.....	....	.....	5	269
Kootenai	a	7	1901	9	23.7	9	10.2	9	8.7	9	....	.....	7	14	9	15.1
	b	8	1904	8	216.2	8	111.9	7	111.4	7	....	.....	3	15	8	106.2
Latah	a	13	1895	13	31.1	13	10.2	13	8.7	13	....	.....	6	18.5	13	22.3
	b	9	1903	13	162.5	8	19.7	12	20.4	7	....	.....	1	5	13	142.5
Lemhi	a	3	1906	3	42	3	4.3	3	5	3	2	2	....	.....	3	37
Lincoln	a	6	1907	6	23.5	6	5	6	18.5	6	4	81	....	.....	6	5
	b		.....	1	175	....	.....	1	100	0	....	.....	....	.....	1	75
Nez Perce	a	11	1904	14	37.1	11	14.6	13	11.3	10	1	2	3	13	14	25.1
	b	6	1909	11	210.3	5	107.4	10	114.9	4	....	.....	....	.....	11	99.5
Oneida	a	5	1901	9	21.1	6	3.9	9	3.7	6	1	0.5	2	2.5	9	17.4
	b	3	1907	4	252.5	2	16.5	4	33.2	2	....	.....	....	.....	4	219.2
Owyhee	a	1	1900	1	15	1	6	1	6	1	....	.....	....	.....	1	9
	b	2	1910	2	1376.5	2	1376.5	2	1376.5	2	....	.....	....	.....	2	0
Shoshone	a	3	1904	3	14	3	3.3	3	2.7	3	....	.....	3	2	3	11.3
Twin Falls	b	10	1909	10	317.7	10	217.7	9	195.7	9	....	.....	....	.....	10	160
Washington	a	8	1891	9	12	6	4.2	9	3.9	6	....	.....	....	.....	9	8.1
Total	a	162	1899.4	206	31.6	179	8.5	204	9.3	177	55	359.0	50	187.5	206	22.3
	b	79	1906.6	105	223.9	74	133.4	100	113.0	69	11	164.0	4	20.0	105	110.4
Aggregate		241	1901.7	311	.....	253	.....	304	.....	246	66	523.0	54	207.5	311	52.1

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Ada	6	8	4	1	2	1	16	Kootenai	7	5	8	1	....	3	17
Bannock	11	....	6	16	3	3	28	Letah	9	2	9	....	4	11	26
Bear Lake	3	3	4	1	1	....	9	Lemhi	1	....	2	....	1	....	3
Bingham	9	....	9	7	4	8	28	Lincoln	3	5	1	....	1	....	7
Blaine	5	3	3	2	2	....	10	Nez Perce	8	6	8	3	2	6	25
Boise	1	1	1	....	....	....	2	Oneida	4	2	6	1	1	3	13
Bonner	9	3	11	5	....	....	19	Owyhee	1	3	....	....	....	....	3
Canyon	10	11	10	2	3	2	28	Shoshone	1	....	3	....	....	....	3
Cassia	2	....	4	2	....	1	7	Twin Falls	5	2	....	....	1	7	10
Custer	1	....	1	2	....	....	3	Washington	5	8	1	....	....	....	9
Elmore	1	1	....	1	....	....	2								
Fremont	13	7	13	2	5	....	27	23 counties	122	73	110	48	31	49	311
Idaho	7	3	6	2	1	4	16	Per cent	.....	23.5	35.4	15.4	10.0	0.7	.....

Reporters' remarks:

Ada County: "Wells sink after irrigation season is over." Bannock County: Two wells abandoned. Bear Lake County: A 40-foot well abandoned. Bingham County: "Entire country underlain with sheet water, evidently from the 'lost rivers' northwest of here." Bonner County: "When the timber has been cut the water level is at least 10 feet lower." Canyon County: "In 10 years the water level has risen about 2 feet." "Wells rise during irrigation." Fremont County: "Water level rises and falls every year; our land subirrigates." "Settlement and cultivation and irrigation

have brought well water nearer the surface." Idaho County: "Running springs have decreased one-half; 75 per cent of wells gone dry; no rain since June." Lincoln County: "Original wells have filled since irrigation began." Nez Perce County: "Exceptionally dry season; water from 2 to 4 feet lower than usual." "This has been an extremely dry season, and very strangely the springs as a rule have been stronger than ever before and some new springs have broken out."

Remarks by several other reporters indicate general recognition of the variability in well water level attending irrigation, practically all of the wells being located in irrigable valleys.

ILLINOIS.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Adams	a	11	1881	18	42.7	11	18.6	18	11.7	11			5	28	18	30.9
	b	9	1900	16	136.4	7	78.6	16	80.9	7			1	20	16	55.6
Alexander	a	6	1893	7	38.4	6	10.7	7	8.1	6			6	23	7	30.3
Bond	a	6	1891	7	20.3	6	7.3	7	6.6	6	2	4	2	8	7	13.7
Boone	a	6	1875	6	30.3	6	11.8	6	9.8	6			3	12	6	20.5
Brown	a	1	1900	3	28.7	1	10	3	8.3	1					3	20.3
	b	2	1905	2	337.5	2	187.5	2	187.5	2					2	150
Bureau	a	5	1866	7	35	7	20.7	7	13.3	7			4	52	7	21.7
	b	6	1897	6	223.5	5	176.8	4	135	4					6	59.5
Carroll	a	1	1905	3	45.7	3	25	3	20	3			2	15	3	25.7
	b	3	1874	4	145.7	3	74	4	49.5	3			3	52	4	96.2
Cass	a	20	1880	21	30.6	19	15.7	20	11.9	18	1	1	12	68	21	18.6
	b	1	1890	1	140	1	90	1	90	1					1	50
Champaign	a	7	1888	7	27.3	7	11	7	9.1	7	1	2	3	15	7	18.1
	b	13	1892	14	105.1	12	73.6	11	75.5	9			1	1	14	33.8
Christian	a	6	1887	12	26.9	12	13.1	12	11	12			9	24.5	12	16
Clark	a	17	1885	17	26.2	14	15.1	17	11.8	14			5	24	17	14.4
Clay	a	5	1883	14	19.2	11	11	14	7.7	11	3	7	4	41	14	11.5
	b	1	1900	2	70	1	15	2	25	1			1	5	2	45
Clinton	a	10	1880	12	22.8	6	7	12	8.4	6			2	6	12	14.4
	b	1	1892	1	70	1	15	1	15	1					1	55
Coles	a	15	1882	15	32	15	19.6	15	13.5	15			6	92	15	18.5
	b	6	1886	6	97.2	6	57.5	6	57.5	6					6	39.7
Cook	a	9	1885	11	19.4	8	5.9	11	5.8	8			3	6	11	13.5
	b	5	1901	5	119.6	1	100	5	102	1					5	17.6
Crawford	a	10	1876	12	27.9	8	16.1	11	10.2	7			5	29.5	12	16.2
	b	2	1904	2	123	1	115	2	87.5	1					2	35.5
Cumberland	a	11	1875	11	24.3	10	12.1	11	12.5	11			3	18	11	11.7
Dekalb	a	4	1879	4	30	4	19.5	4	17.5	4			2	8	4	12.5
	b	6	1892	6	127.2	3	58.7	4	60.2	1					6	69.5
Dewitt	a	7	1880	7	23.7	7	8.6	7	3	7			7	39	7	20.7
Douglas	a	5	1851	7	29.3	6	14.3	7	11.3	6			3	15	7	18
	b	6	1895	8	94.1	5	60.8	8	65.9	5			2	27	8	28.2
Dupage	a	5	1867	7	26.7	4	15.5	7	6.4	4			3	34	7	20.3
	b	7	1898	9	89	7	42.7	9	46.2	7			2	13	9	42.8
Edgar	a	6	1895	11	29.1	7	20.4	11	12.6	11			4	26	11	16.5
	b	1	1904	3	130	1	66	3	62	1					3	68
Effingham	a	8	1888	16	20.7	14	11.2	16	8.9	14			9	33	16	11.8
	b	1	1899	1	80	1	60	1	60	1					1	20
Fayette	a	10	1889	14	28.7	8	10.6	14	10.6	8			5	12	14	18.1
	b	..	.....	1	78	1	60	1	59	1			1	1	1	19
Ford	a	3	1863	3	20	3	8.7	3	3.3	3			3	16	3	16.7
	b	5	1896	7	94.6	6	40.3	7	48.9	6					7	45.7
Franklin	a	14	1882	14	30.4	12	12.1	14	12.4	12	1	1			14	18
	b	1	1907	1	150			1	60	0					1	90
Fulton	a	16	1878	22	33.4	21	13.7	22	7.4	21			14	129	22	26
	b	1	1900	2	200	1	270	2	172	1			1	10	2	28
Gallatin	a	2	1825	6	31.8	4	17	4	15.5	2			2	6	6	17.3
	b	4	1904	5	135.2	1	15	5	94.4	1			1	8	5	40.8
Greene	a	17	1875	17	23.8	14	13	17	12.2	14	1	1	9	24.5	17	11.6
Grundy	a	8	1868	8	26.6	4	9.5	8	10.1	4			4	22	8	16.5
	b	1	1899	2	117	1	114	2	82	1					2	35
Hamilton	a	3	1870	3	18.3	3	8.3	3	8.3	3					3	10
Hancock	a	17	1884	18	27.4	15	15.1	18	10.8	15			7	41	18	16.6
Henderson	a	4	1863	6	31	6	11.3	6	4.2	6			3	43	6	26.8
	b	2	1895	2	125.5	2	57	2	57	2					2	68.5
Henry	a	16	1881	16	28.8	16	11.1	16	8.6	16			12	40.5	16	20.2
	b	3	1907	5	202.4	3	180	4	136.2	2			1	100	5	81.4
Iroquois	a	2	1866	3	19.3	3	6.7	3	6.7	3					3	12.7
	b	10	1894	14	116.4	7	133	14	109.7	7					14	6.6
Jackson	a	8	1884	10	31.2	9	14.1	10	10.9	9			6	28	10	20.3

ILLINOIS—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Jasper	*a* 5	1889	5	15	3	6.3	5	7	3			1	2	5	8
Jefferson	*a* 13	1887	15	26	12	12.2	15	12.3	12	4	7	6	26	15	13.7
	b 3	1906	6	93.7	2	42.5	6	69	2			1	5	6	24.7
Jersey	*a* 7	1882	9	27.2	9	9.9	9	8.3	9	3	6	4	21	9	18.9
Jo Daviess	*a* 1	1880	1	20	1	10	1	6	1			1	4	1	14
	b 2	1885	2	121	2	62.5	2	57.5	2			1	10	2	63.5
Johnson	*a* 4	1899	4	18.5	4	8.2	4	8	4	2	3	1	4	4	10.5
Kane	*a* 5	1876	7	30.4	7	10.6	7	7.7	7			5	20	7	22.7
	b 16	1892	17	128.3	16	84.1	17	81.9	16	2	2	3	30	17	46.4
Kankakee	*a* 12	1864	14	28.2	12	7.2	14	7.3	12			10	19	14	20.9
	b 1	1880	5	127	3	139	5	91.4	3			3	80	5	35.6
Kendall	*a* 3	1852	5	20.6	5	6.2	5	4.6	5			3	8	5	16
	b 4	1895	9	109	4	82.2	9	84.3	4			1	5	9	24.7
Knox	*a* 11	1879	15	32.7	15	15.7	15	9.8	15			10	89	15	22.9
	b 3	1893	4	78.2	4	39.2	4	38.7	4			1	2	4	39.5
Lake	*a* 4	1867	8	23.3	4	2.9	8	3.8	4			2	1	8	19.5
	b 3	1892	3	130	3	96.3	3	96.3	3					3	33.7
Lasalle	*a* 8	1866	16	26.9		97.2	16	5.8	9			8	28	16	21
	b 9	1901	9	162.8	5	124	9	114.4	5			1	5	9	48.3
Lawrence	*a* 8	1876	8	29.4	8	16.7	8	13.9	8			3	23	8	15.5
	b 1	1900	1	200	1	185	1	185	1					1	15
Lee	*a* 6	1891	8	27	3	14	8	14.6	3	1	1			8	12.4
	b 3	1892	4	141.5	2	38	4	55.2	2					4	86.2
Livingston	*a* 8	1879	11	26.4	8	20.1	11	14.5	8			8	40	11	11.8
	b 8	1899	8	187.1	8	158.7	8	152.2	8			3	52	8	34.9
Logan	*a* 5	1881	5	26.4	5	12.8	5	7.4	5			5	27	5	19
Macon	*a* 5	1890	5	33.6	3	9.3	5	9.6	3					5	24
	b 4	1898	4	97	3	80	4	42	3			2	85	4	55
Macoupin	*a* 14	1885	20	24.1	14	11.9	20	12.9	14			6	19.5	20	11.1
Madison	*a* 14	1887	23	27.2	14	12.4	23	11.5	14	4	3.5	3	21	23	15.8
	b 1	1873	1	65			1	50	0					1	15
Marion	*a* 5	1879	6	20.8	4	6.5	6	5.7	4			1	4	6	15.2
	b 1	1903	1	100	1	80	1	80	1					1	20
Marshall	*a* 6	1877	6	44.5	6	6.2	6	5.3	6	3	6	2	11	6	39.2
	b 2	1896	2	74	2	22.5	2	22.5	2					2	51.5
Mason	*a* 2	1879	5	51.6	5	18.6	5	13	5			4	28	5	38.6
	b 2	1897	2	157.5	2	47.5	2	43.5	2			1	8	2	114
Massac	*a* 6	1871	7	50.3	6	14	6	14	5	1	2	3	14	7	37.9
McDonough	*a* 8	1876	8	32.9	8	17.9	8	13.9	8			7	32	8	19
	b 1	1904	2	122.5	1	45	2	52.5	1					2	70
McHenry	*a* 3	1873	6	31	2	6.5	6	6.8	2					6	24.2
	b 1	1880	1	80	1	40	1	40	1					1	40
McLean	*a* 5	1875	7	31.6	5	13.2	7	10.1	5			2	5	7	21.4
	b 4	1892	4	100	4	53.7	4	53.7	4					4	46.2
Menard	*a* 7	1884	9	25	9	14.6	9	11.7	9			9	26	9	13.3
Mercer	*a* 9	1888	12	31.7	11	12.2	12	10.2	11	1	1	8	38	12	21.6
	b 5	1900	7	112.9	7	72.1	7	70.7	7			1	10	7	42.1
Montgomery	*a* 14	1884	25	22.6	19	7.7	24	6.7	18	2	3	12	38	25	16
Morgan	*a* 12	1892	18	23.8	14	11.9	18	9.6	14	1	1	4	14	18	14.2
	b 1	1901	1	81	1	65	1	67	1	1	2			1	14
Moultrie	*a* 1	1870	4	28	4	11.2	4	10.7	4	2	3	2	5	4	17.2
	b 3	1899	5	74.8	1	50	5	51.8	1					5	23
Ogle	*a* 5	1876	5	26	4	8.5	5	4.4	4	1	1	3	17	5	21.6
	b 9	1889	9	75	8	41.6	9	36.1	8	1	1	3	39	9	38.9
Peoria	*a* 13	1884	13	33.5	10	18	13	12	10			7	40	13	21.5
	b 2	1898	2	118.5	2	63	1	60	1			1	10	2	60.5
Perry	*a* ..		1	16	1	10	1	10	1					1	6
Piatt	*a* 11	1894	11	40.4	11	23.5	11	20.6	11			7	32	11	19.8
	b 3	1899	3	125.7	3	88.3	3	88.3	3					3	37.3
Pike	*a* 15	1878	19	26.2	12	9.7	19	7.9	12			3	17	19	18.2
	b 1	1898	2	140	1	100	2	70	1					2	70
Pope	*a* ..		3	26	1	14	3	6	1			1	4	3	20
Pulaski	*a* 4	1899	4	73.7	2	9.5	4	11	2	1	2	1	7	4	62.7
Putnam	*a* 2	1867	2	72.5	2	3.5	2	3.5	2					2	69
Randolph	*a* 12	1879	13	44.5	10	14.5	13	19.3	10	2	6	5	16	13	25.2
Richland	*a* 5	1875	7	18.9	4	9.7	7	5.9	4			4	16	7	13
	b 1	1890	1	90	1	70	1	70	1					1	20
Rock Island	*a* 11	1874	14	28.9	11	7.4	14	7.3	11			4	23	14	21.6
	b 1	1898	1	115			1	52	0					1	63
St. Clair	*a* 10	1884	13	31.8	9	17.8	13	16.4	9	4	12	1	10	13	15.4
	b 1	1880	1	75	1	40	1	40	1					1	35
Saline	*a* 2	1876	6	18.8	4	11.7	6	8.8	4			1	3	6	10
Sangamon	*a* 4	1877	8	23.7	7	9.1	8	9	7			3	8	8	14.7
Schuyler	*a* 8	1878	12	28.4	7	8.4	12	5.2	7			7	22	12	23.2
	b 1	1896	1	161	1	35	1	30	1			1	5	1	131
Scott	*a* 4	1871	9	28.3	4	11	9	7.7	4			4	17.5	9	20.6
Stark	*a* 14	1877	15	33.8	13	15.1	13	10.8	11	2	8	7	51	15	21.1
	b 1	1903	2	130	2	95	2	95	2					2	35

ILLINOIS—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Stephenson	a	4	1874	7	31.6	6	12.5	7	8.9	6			2	18	7	22.7
	b	6	1894	10	118.3	8	60.5	7	76	5	2	20	1	40	10	62.9
Tazewell	a			4	24	3	7.7	4	4.7	3	1	1	1	6	4	19.2
	b	3	1907	6	131.3	3	71.7	6	65.8	3					6	65.5
Union	a	4	1886	9	34.9	7	15.4	9	10.8	7			3	21	9	24.1
Vermilion	a	4	1881	8	24.6	6	11	8	7.1	6			3	17	8	17.7
	b	1	1904	5	92	2	31	3	55	0					5	44.6
Wabash	a	5	1896	10	24	10	12.2	10	9.4	10			6	28	10	14.6
	b	1	1900	1	275	1	150	1	150	1					1	125
Warren	a	6	1876	6	35.5	5	11.4	6	7.3	5			4	18	6	28.2
	b	3	1895	3	158	2	92.5	3	95	2					3	63
Washington	a	8	1870	9	28	2	8.5	9	9.8	2			2	9	9	18.2
	b	2	1890	3	111.7	1	85	3	60	1			1	15	3	51.7
Wayne	a	5	1882	5	34	5	15.3	5	12	5			4	16.5	5	22
	b	2	1901	2	76	2	54	2	54	2					2	22
White	a	3	1838	3	25	3	11.3	3	14.7	3	3	10			3	10.3
Whiteside	a	11	1890	11	23.5	9	9.1	10	8.1	8			4	6	11	15.7
	b	2	1892	2	80	1	10	2	12	1			1	1	2	68
Will	a	9	1881	10	37.9	9	9.7	10	7	9			5	27	10	30.9
	b	11	1898	11	120.7	10	77.1	11	78	10	1	10	4	21	11	42.7
Williamson	a	6	1878	8	32.6	8	13.1	8	12.1	8			2	8	8	20.5
	b	1	1903	1	108	1	40	1	40	1					1	68
Winnebago	a	4	1858	4	36	4	7.2	4	2.2	4			4	20	4	33.7
	b	2	1895	3	111	1	145	3	56.7	1					3	54.3
Woodford	a	9	1877	11	37.3	10	17.1	11	14.8	10			6	28.5	11	22.5
	b	1	1909	5	118	1	160	5	65	1					5	53
Total	a	710	1879.6	927	29.1	738	12.7	918	10.0	734	47	92.5	401	2,053.0	927	18.9
	b	230	1896.1	297	122.5	204	81.6	283	76.8	191	7	35.0	44	660.0	297	46.2
Aggregate		940	1883.6	1,224		942		1,201		925	54	127.5	445	2,713.0	1,224	25.6

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Adams	10		18	9	6	1	34	Logan	2		5				5
Alexander	3		5	2			7	Macon	3		6	2	1		9
Bond	3	1	6				7	Macoupin	8	9	11				20
Boone	2		4	2			6	Madison	9	7	15	2			24
Brown	1		3			2	5	Marion	4	2	5				7
Bureau	5	4	3	2	2	1	13	Marshall	3		2	6			8
Carroll	2		2	3		2	7	Mason	3		3	1	2	1	7
Cass	8	5	14	3			22	Massac	3		4	2	1		7
Champaign	7	3	14	2	2		21	McDonough	3		8	1	1		10
Christian	5	1	10	1			12	McHenry	3		4	3			7
Clark	6	4	12	1			17	McLean	4		6	4	1		11
Clay	6	8	5	3			16	Menard	3	3	6				9
Clinton	5	2	10	1			13	Mercer	5	1	12	5		1	19
Coles	8	2	12	6	1		21	Montgomery	8	4	20	1			25
Cook	6	3	12	1			16	Morgan	7	3	16				19
Crawford	4	6	5	3			14	Moultrie	3	1	7	1			9
Cumberland	4	2	9				11	Ogle	5	2	5	6	1		14
Dekalb	4	2	2	2	4		10	Peoria	6	1	11	2	1		15
Dewitt	2		6	1			7	Perry	1	1					1
Douglas	5	4	7	3	1		15	Piatt	6	2	9	3			14
Dupage	5		11	3	2		16	Pike	8	3	13	4	1		21
Edgar	4	3	8	2		1	14	Pope	2		3				3
Effingham	6	5	12				17	Pulaski	2			2	2		4
Fayette	6	2	10	3			15	Putnam	1				2		2
Ford	3	1	2	6	1		10	Randolph	5	2	7	3	1		13
Franklin	5	3	10		2		15	Richland	3	3	5				8
Fulton	9	2	11	11			24	Rock Island	5	3	7	3	2		15
Gallatin	4	1	6	3	1		11	St. Clair	6	2	11	1			14
Greene	6	9	8				17	Saline	3	2	4				6
Grundy	4	3	5	2			10	Sangamon	3	1	7				8
Hamilton	1	2	1				3	Schuyler	5		11	1		1	13
Hancock	6	3	14	1			18	Scott	5	1	7	1			8
Henderson	2		4	2	2		8	Stark	5	1	14	1	1		17
Henry	9		16	2	2	1	21	Stephenson	6		8	3	5	1	17
Iroquois	6	9	8				17	Tazewell	4		4	3	3		10
Jackson	3		9	1			10	Union	4		8	1			9
Jasper	2	2	3				5	Vermilion	5	1	8	3	1		13
Jefferson	7	6	12	3			21	Wabash	4	2	8			1	11

ILLINOIS—Continued.

PROPORTIONATE DEPTHS—Continued.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Jersey	4	2	5	2	....	....	9	Warren	3	....	4	3	2	....	9
Jo Daviess	1	....	1	1	1	....	3	Washington	5	1	7	3	1	....	12
Johnson	2	2	2	....	....	....	4	Wayne	3	....	6	1	....	....	7
Kane	10	1	13	4	6	....	24	White	1	1	2	....	....	....	3
Kankakee	6	1	13	4	1	....	19	Whiteside	5	....	11	....	2	....	13
Kendall	5	2	9	3	....	....	14	Will	6	1	9	7	4	....	21
Knox	6	....	16	2	1	....	19	Williamson	3	2	3	3	1	....	9
Lake	4	1	7	3	....	....	11	Winnebago	4	....	3	2	2	....	7
Lasalle	7	3	12	7	3	....	25	Woodford	6	....	11	4	1	....	16
Lawrence	3	....	9	....	....	....	9								
Lee	5	3	6	....	1	2	12	97 counties	445	179	748	203	79	15	1,224
Livingston	7	4	10	5	....	....	19	Per cent	....	14.6	61.1	16.6	6.5	1.2	....

Reporters' remarks:

Bureau County: "Most all dug wells have failed." Clay County: "We are compelled to go deeper for water than when wells were first dug." "Wells once strong have failed entirely." Dekalb County: "Tiling dried up most of the dug wells, or else they became polluted and were filled up." "Wells made deeper on account of water supply running short." Douglas County: "Forty years ago shallow wells (about 16 feet deep) supplied a greater part of the water; now water is obtained at depths of 40 to 75 feet." Dupage County: Wells dried by tile drains. "When this country was first settled in 1837–40 good water was obtained by digging wells 6 to 10 feet deep; in 1850 they had to dig 20 to 30 feet, and in 1860 from 40 to 50 feet; after that drilled or tubular wells were made, 1870, 60 to 70 feet; 1880, 75 to 80 feet; 1890 to 1900, 90 to 100 feet." Ford County: "Prior to 1880 we used surface wells ranging in depth from 3 to 12 feet, but when we tiled our land those wells all failed, and now the country is full of driven [drilled] wells from 45 to 200 feet deep; the springs all failed when we tiled." Fulton County: "The water level is from 7 to 10 feet lower than 20 years ago." Grundy County: "Water level is lower; 18 years' experience in well drilling shows this; usually 12 to 20 feet." Henry County: "The water level seems to have gone down about 5 feet." Jersey County: "Some wells have been sunk deeper." Kane County: "The old dug wells put in by first settlers are of little value." "All springs and wells have greatly diminished in flow and depth of water, and this has been going on for a generation or more." Kankakee County: "Artesian wells are lowering about 4 feet in 5 years." Kendall County: "Many dug wells that were classed as good wells have gone dry." "The surface wells have all or nearly all gone dry since the farms were drained." Knox County: "The water level has lowered 10 to 15 feet in this locality during the past 20 years." McDonough County: "The water has declined to a lower level in 30 or 40 years about 2 or 3 feet." Mason County: "The draining of the swamps has lowered the water level about 20 feet in 30 years." Mercer County: "The water level is 5 to 15 feet lower than formerly; this is due to tile drainage." Montgomery County: "A spring broke out 5 years ago where no water ever ran before; runs ½-inch stream the year 'round." "The water has gone down from 3 to 4 feet in the last 25 years owing to better drainage." "A well when first dug was very strong, but has been weak in recent years, caused by a soft maple grove near it." "Depth of water in wells is higher than usual on account of heavy rains." Peoria County: "Nearly all dug wells failed." "I note no change in water level; was born here 50 years ago." Piatt County: "The water is getting deeper year after year; the time of shallow wells is past; some wells go to 80 feet for supply." "Cultivation does not seem to have affected the water supply in this locality." "Drainage by tiling led to the abandonment of shallow wells, but the dug wells 30 to 50 feet deep have remained on the same average level; the deeper drilled wells have never shown any variation." Richland County: "Water stands in wells about 10 feet lower than

it used to be some 50 years ago." Rock Island County: "Four-fifths or more of the dug wells have lost their water supply; before 1850 there were many springs—all have failed but two; the loss of the timber, cultivation, wash of the surface, loss of the wild grass, all tend to eliminate the moisture." St. Clair County: "The water stands higher than it stood 35 years ago in dug and drilled wells." "Wells are higher than usual on account of excessive rains." Saline County: "A well just before a rainstorm will fall sometimes 2 feet or more." Stark County: "A great many dug wells that formerly were good are now dry, making it necessary to drill to lower veins." "Several springs have failed in the last 10 years." Stephenson County: "Wells all drilled deeper in the last 30 years; there are still a few springs, though most of them have failed in the last 40 years." Union County: "Springs began to fail in 1905, and are now dry." White County: "Owing to constant rains wells are fuller than usual." Will County: "Twenty years ago dug wells were mostly in use, but they ran dry after a year or two." Winnebago County: "A spring went dry 8 years ago."

While many reporters emphasize the observed effect of drainage in lowering the well water level, and while this relation is indubitable, the records of other stations and counties and for the State as a whole indicate (1) that the lowering is not confined to drained districts, and (2) that the average is not greatly different in the drained and the undrained portions of the State.

INDIANA.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Adams	*a*	1	1897	2	35	2	3.5	2	2	2	....	.....	2	3	2	33
	b	7	1896	10	79.6	10	46.5	6	50.3	6	....	.....	2	25	10	35.6
Allen	*a*	3	1858	5	26.6	4	6.5	5	3.8	4	....	.....	3	12	5	22.8
	b	7	1897	9	82.6	5	38.2	8	38.1	4	....	.....	2	11	9	46.4
Bartholomew	*a*	4	1891	8	32.7	8	10.2	7	5.9	7	....	.....	6	35	8	26.9
	b	2	1902	3	68	3	33.3	3	30	3	....	.....	1	10	3	38
Benton	*a*	4	1879	4	27.5	4	18	4	14	4	....	.....	4	16	4	13.5
	b	5	1899	5	130.4	2	155.5	5	80.6	2	....	.....	....	.....	5	49.8
Blackford	*a*	....	.....	7	21.4	6	4.8	7	1.6	6	....	.....	6	25	7	19.9
	b	11	1901	11	100.5	9	72.6	11	74.3	9	....	.....	....	.....	11	26.2
Boone	*a*	7	1889	8	23.4	8	12.2	8	10	8	....	.....	4	18	8	13.4
	b	6	1888	6	74.5	1	78	6	39.2	1	....	.....	....	.....	6	35.3
Brown	*a*	6	1873	8	22.9	6	7.3	8	5.6	6	....	.....	5	12	8	17.2
Carroll	*a*	9	1872	9	21.2	9	3.8	9	2.3	9	....	.....	5	14	9	18.9
	b	3	1897	4	90.7	4	52.4	4	49.7	4	....	.....	2	10.5	4	41
Cass	*a*	4	1884	14	30.8	4	16	14	12.9	4	....	.....	2	8	14	17.9
	b	6	1902	6	96.5	6	62.2	5	41.6	5	....	.....	2	25	6	38.5
Clark	*a*	3	1842	3	28.7	3	8.3	3	8.3	3	....	.....	....	.....	3	20.3
	b	7	1900	7	78.1	7	25.9	7	11.7	7	....	.....	6	99	7	66.4
Clay	*a*	3	1891	3	27	3	5.7	3	3.8	3	....	.....	3	5.5	3	23.2
Clinton	*a*	5	1876	9	26.9	7	9.7	9	9.4	7	....	.....	4	18	9	17.4
	b	2	1906	5	98.8	....	.....	5	84	0	....	.....	....	.....	5	14.8
Crawford	*a*	6	1881	11	19.3	11	6.2	5	4.3	5	....	.....	5	13.5	11	14.3
Daviess	*a*	4	1885	8	26.1	6	5.7	8	4.6	6	3	5	3	12	8	21.5
Dearborn	*a*	3	1882	6	25.5	6	10.5	6	9.3	6	....	.....	3	7	6	16.2
Decatur	*a*	5	1895	5	34.8	5	16.4	3	7.3	3	....	.....	2	8	5	20
	b	1	1893	3	80	1	25	3	42	1	....	.....	....	.....	3	38
Dekalb	*a*	8	1882	10	32.9	9	19.1	9	9.9	8	....	.....	5	63	10	20
	b	4	1891	5	67.6	4	35.3	5	36.8	4	....	.....	1	3	5	30.8
Delaware	*a*	1	1855	1	35	1	5	1	4	1	....	.....	1	1	1	31
	b	2	1898	2	70	2	56	2	52.5	2	....	.....	1	7	2	17.5
Dubois	*a*	5	1878	8	23.1	2	6	8	11.2	2	....	.....	1	6	8	11.9
	b	3	1901	3	111.3	....	.....	3	56.7	0	....	.....	....	.....	3	54.7
Elkhart	*a*	8	1861	8	28.2	8	8.9	8	7.1	8	....	.....	4	14	8	21.1
	b	4	1883	5	97.6	3	51	5	56.6	3	....	.....	....	.....	5	41
Fayette	*a*	6	1879	6	31.8	6	9.2	6	7	6	....	.....	3	13	6	24.8
	b	2	1901	2	92.5	2	7.5	2	0	2	....	.....	2	15	2	92.5
Floyd	*a*	....	.....	1	27	1	10	1	6	1	....	.....	1	4	1	21
Fountain	*a*	3	1888	5	25.2	5	4.3	5	2.9	5	....	.....	2	7	5	22.3
	b	3	1909	3	87.3	3	55	1	40	1	....	.....	....	.....	3	32.3
Franklin	*a*	3	1843	7	27.6	7	11.3	7	8.6	7	3	8	4	27	7	19
Fulton	*a*	6	1870	6	19.3	6	6.5	6	4.5	6	....	.....	2	12	6	14.8
	b	10	1894	15	71.3	8	43.7	15	36	8	....	.....	6	79	15	35.3

INDIANA—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Gibson	a	6	1880	6	26.7	5	11.4	6	8.5	5			2	9	6	18.2
	b	4	1900	5	115.4	3	53.3	5	63	3					5	52.4
Grant	a	7	1888	7	22.9	6	10.8	7	11.7	6			3	10	7	11.1
	b	1	1901	1	87			1	82	0					1	5
Greene	a	6	1870	6	30	6	11.1	6	9.7	6	1	2	5	10	6	20.2
	b	3	1896	3	108.3	3	89.7			0					3	18.7
Hamilton	a	14	1871	16	25.2	14	15.4	16	12.2	14			6	42	16	13.1
	b	4	1905	7	156	4	179.5	7	140.1	4					7	15.9
Hancock	a	2	1892	2	15.5	2	9.5	2	6.5	2			1	6	2	9
	b	1	1906	1	150	1	135	1	135	1					1	15
Harrison	a			3	20	2	9	3	6	2			1	10	3	14
	b	4	1900	5	110	5	30	4	26.2	4					5	80
Hendricks	a	5	1896	10	28	5	24.2	9	10.9	4			2	12	10	15
	b	6	1897	7	69.7	6	57	7	53.1	6			1	10	7	16.6
Henry	a	5	1885	7	29.1	5	10.2	7	7	5			3	7	7	22.1
	b	1	1895	1	65			1	35	0					1	30
Howard	b	6	1896	6	80.1	6	69.6	3	89.2	3			3	9	6	12
Huntington	a	4	1873	4	26.5	4	6.5	4	3.2	4			4	13	4	23.2
	b	6	1894	6	85.7	4	52.2	5	50.8	3			1	5	6	28.3
Jackson	a	5	1888	5	26.2	4	7.5	5	6.2	4	1	2	3	13	5	20
	b	1	1908	1	100	1	75	1	75	1					1	25
Jasper	a	1	1900	4	25.7	2	20	4	13.5	2					4	12.2
	b	6	1901	6	96.2	3	70	6	92.3	3					6	3.8
Jay	a	1	1875	2	25	2	11	2	2.5	2			2	17	2	22.5
	b	11	1902	11	111	8	64	11	63.4	8			4	20	11	47.6
Jefferson	b	4	1897	4	70	1	35	4	16.7	1			1	5	4	53.2
Jennings	a	6	1867	10	22.9	6	11	10	7	6			1	10	10	15.9
	b	6	1904	6	75.7	6	49.6	6	48.7	6			1	5	6	27
Johnson	a	1	1870	2	30	2	7	2	4	2			2	6	2	26
Knox	a	5	1872	5	35.2	5	16.8	5	5.6	5			5	56	5	29.6
	b	4	1901	4	128	4	83.7	4	83	4			1	3	4	45
Kosciusko	a	13	1884	13	23.5	13	14.2	13	11.4	13			10	37	13	12.1
	b	8	1902	8	86.1	8	49.9	5	62	5			1	5	8	36.9
Lagrange	a	6	1872	7	29.4	6	5	7	2.4	6			4	18	7	27
	b	2	1890	2	92.5	2	10	2	10	2					2	82.5
Lake	a	2	1856	4	25.5	4	11.2	4	9.2	4			2	8	4	16.2
	b	1	1881	2	91	2	65	2	55	2			2	20	2	36
Laporte	a	5	1889	12	24.7	9	12.6	12	7	9	1	1	7	40	12	17.7
Lawrence	a	7	1888	11	30	8	8.3	11	7.4	8	4	5	3	15	11	22.6
	b	7	1904	11	100.2	6	31.5	11	38.5	6					11	61.6
Madison	a	2	1887	2	15.5	2	5	2	2.5	2			1	5	2	13
	b	6	1906	7	99.9	6	59.8	4	39.7	3			1	10	7	44.3
Marion	a	13	1887	13	27.6	11	9.2	13	8.2	11			10	29	13	19.5
	b	3	1895	3	93.7	1	48	3	74.3	1					3	19.3
Marshall	a	3	1886	7	31.1	4	12.5	7	10.1	4			2	7	7	21
	b	4	1891	6	67.8	6	39.7	6	37.1	4			2	15	6	30.7
Martin	a	4	1881	7	32	7	13.1	7	11.6	7	1	1	4	12	7	20.4
	b	1	1908	3	81.7	1	25	3	20	1			1	5	3	61.7
Miami	a	4	1886	8	29	4	16.5	8	11.2	4			3	13	8	17.7
	b	7	1900	10	84.6	7	65.1	9	60.3	6			3	8	10	24.8
Monroe	b	3	1908	3	70.7	3	27	3	23.7	3			1	10	3	47
Montgomery	a	13	1873	13	22.5	13	7.3	13	5.3	13			7	25.5	13	17.2
	b	3	1898	3	109.3	3	80	3	76.7	3			1	10	3	32.7
Morgan	a	6	1882	12	32.2	8	17.4	11	8.1	7			6	53	12	22.2
	b	1	1909	3	96.7	1	96	3	65.3	1					3	31.3
Newton	a	3	1888	4	30.7	4	12.5	4	9.2	4			3	13	4	21.5
	b	12	1890	14	124.6	9	73.7	14	76.5	9	1	3	5	33	14	48.1
Noble	a	5	1873	5	23.8	4	13	4	10.7	3			2	11	5	12
	b	5	1892	6	95.7	5	74.2	6	54.7	5			2	59	6	41
Orange	a	2	1877	2	32.5	2	7.5	2	3.5	2			2	8	2	29
Owen	a	6	1877	9	23	8	9.2	9	6.2	8			5	24	9	16.8
	b	3	1906	3	91	3	20.3	2	23	2					3	70.7
Perry	a	4	1881	4	24	4	14.2	4	12.5	4	1	5	3	12	4	11.5
	b	4	1909	6	147.3	5	79	1	40	0					6	74.8
Pike	a	1	1835	1	35			1	20	0					1	15
	b	2	1906	2	90	1	90	2	70	1			1	10	2	20
Porter	a	8	1881	11	24.2	5	11.8	11	8.9	5			3	12	11	15.3
	b	1	1880	2	102.5	1	15	2	27	1			1	11	2	75.5
Pulaski	a	11	1899	13	26.5	9	17.7	13	17	9			3	12	13	9.5
	b	5	1905	7	98.7	5	102.8	6	88.5	4			2	7	7	10.9
Putnam	a	3	1877	3	31	3	11	3	6.7	3			2	13	3	24.3
	b	5	1904	5	101.2	5	71	5	67	5			1	20	5	34.2
Randolph	a	5	1889	5	26.2	5	7.8	5	4.8	5			3	15	5	21.4
	b	2	1900	3	122.7	2	58.5	3	69	2			1	20	3	53.7
Ripley	a	9	1876	10	22.3	10	6.1	10	4.4	10	1	1	4	18	10	17.9
Rush	a	2	1847	5	29.4	5	16.4	5	12.8	5			2	18	5	16.6
	b	5	1899	8	90.9	3	55	8	51.2	3			2	15	8	39.6
St. Joseph	b	5	1892	7	88	4	27.2	3	28.7	0					7	60.1
Scott	a	3	1878	5	27.2	3	7.3	5	10.2	3	1	1	1	2	5	17
	b			1	80			1	40	0					1	40
Shelby	a	8	1889	10	25.8	8	17.2	10	14.9	8			4	17	10	10.9
	b	1	1904	1	198	1	50	1	50	1					1	148
Spencer	a	1	1890	4	22.2	2	7.5	4	5.5	2			2	5	4	16.7

INDIANA—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Starke	*a*	7	1904	8	21.9	5	8.2	8	12.9	5			2	3	8	9
	b	1	1898	1	85	1	80	1	80	1					1	5
Steuben	*a*	6	1879	6	30.7	5	9	6	3.7	5			4	28	6	27
	b	4	1892	4	130.7	2	88	4	75.2	2					4	55.5
Sullivan	*a*	6	1865	6	25	6	11.2	6	10.8	6	3	11	3	13	6	14.2
Switzerland	*a*	6	1856	8	23.7	8	4.7	8	3.9	8	2	2	4	9	8	19.9
	b	2	1898	2	64			2	0	0					2	64
Tippecanoe	*a*	3	1890	5	24.2	3	6.7	5	5.4	3			2	5	5	18.8
	b	3	1893	5	77	3	36	5	45	3			2	13	5	32
Tipton	*a*	1	1894	4	19	4	14	4	10.5	4			3	14	4	8.5
	b	4	1902	4	135	4	124.2	4	124.2	4					4	10.7
Vanderburg	*a*	4	1893	6	31.5	2	14	6	9.2	2			1	4	6	22.3
	b			1	90			1	40	0					1	50
Vermilion	*a*	4	1882	4	20.5	4	9.5	4	7.2	4			3	9	4	13.2
Vigo	*a*	3	1872	5	25.2	3	9.7	5	7.6	3			1	10	5	17.6
	b	1	1900	1	165	1	165	1	165	1					1	0
Wabash	*a*	3	1879	5	39.2	3	11.7	5	5	3			3	28	5	34.2
	b	7	1904	7	79.3	4	28	7	19.9	4			1	5	7	59.4
Warren	*a*	6	1887	7	29.9	6	17	7	16	6			1	10	7	13.9
	b	7	1898	8	128.4	7	74.3	7	63.6	6			3	30	8	64
Warrick	*a*	12	1870	17	23.6	13	11.3	17	9.9	13			5	22	17	13.6
Washington	*a*	10	1872	10	32.2	10	8.7	10	7	10	3	2.5	3	20	10	25.2
	b	4	1902	6	88.8	3	51	6	40.7	3			1	5	6	48.2
Wayne	*a*	7	1873	12	28	6	12.5	12	7.4	6			6	15	12	20.6
	b	4	1906	5	140			5	63.4	0					5	76.6
Wells	*a*			3	27			3	6	0					3	21
	b	1	1885	1	92	1	45	1	45	1					1	47
White	*a*	8	1889	8	25.1	3	7.7	8	8.4	3			3	13	8	16.7
	b	5	1900	5	78.6	1	30	5	47	1					5	31.6
Whitley	*a*	9	1887	11	28.5	9	19.3	11	13.3	9			5	35	11	15.2
	b	9	1897	9	86.9	7	45.6	9	50.6	7			2	39	9	36.3
Total	*a*	419	1879.0	576	26.6	458	11.0	563	8.5	445	25	46.5	267	1,255.5	576	17.9
	b	301	1898.8	363	96.3	249	59.3	328	55.4	212	1	3.0	73	691.5	363	40.8
Aggregate		720	1887.3	939		707		891		657	26	49.5	340	1,946.0	939	26.7

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Adams	4		4	8			12	Jennings	5		14	2			16
Allen	4		8	4	2		14	Johnson	1		1	1			2
Bartholomew	4		7	4			11	Knox	3		5	4			9
Benton	3	2	3	2	2		9	Kosciusko	7	5	11	4	1		21
Blackford	4	1	13	4			18	Lagrange	3	1	3	3	2		9
Boone	5	3	7	4			14	Lake	3		4	2			6
Brown	2	2	5	1			8	Laporte	5	3	8	1			12
Carroll	5	3	7	2	1		13	Lawrence	7		11	7	2	2	22
Cass	5		16	3	1		20	Madison	3	1	4	2	2		9
Clark	3		6	1	2	1	10	Marion	4	1	14	1			16
Clay	1		3				3	Marshall	5	4	4	4	1		13
Clinton	4	2	11	1			14	Martin	3	1	6	2	1		10
Crawford	4	3	8				11	Miami	5	2	13	2	1		18
Daviess	3		8				8	Monroe	1			3			3
Dearborn	2		6				6	Montgomery	5	1	14		1		16
Decatur	4	1	5	1	1		8	Morgan	6	3	9	3			15
Dekalb	5	1	10	4			15	Newton	6	1	10	2	4	1	18
Delaware	1		2	1			3	Noble	4	3	4	3	1		11
Dubois	4	3	6	1	1		11	Orange	1		1	1			2
Elkhart	4	1	7	4	1		13	Owen	4	2	8		1	1	12
Fayette	3		6		1	1	8	Perry	3	1	3	2	4		10
Floyd	1		1				1	Pike	1		3				3
Fountain	3		5	3			8	Porter	6	1	10		2		13
Franklin	3		7				7	Pulaski	7	14	5	1			20
Fulton	5	4	7	8	2		21	Putnam	2		5	3			8
Gibson	4		8	1	1	1	11	Randolph	3		6	1	1		8
Grant	3	4	4				8	Ripley	4	1	9				10
Greene	3	1	7	1			9	Rush	5	3	4	6			13
Hamilton	7	6	16	1			23	St. Joseph	2			4	3		7
Hancock	1	1	2				3	Scott	2		5	1			6
Harrison	3	1	3	2		2	8	Shelby	4	4	6			1	11
Hendricks	5	6	10	1			17	Spencer	2	1	3				4
Henry	3		7	1			8	Starke	4	6	3				9
Howard	2	4	2				6	Steuben	3		4	5	1		10
Huntington	3		8	2			10	Sullivan	2		6				6
Jackson	2		5	1			6	Switzerland	4		8		2		10
Jasper	3	6	4				10	Tippecanoe	3	2	4	3	1		10
Jay	4		8	3		2	13	Tipton	3	5	3				8
Jefferson	2		1	1	2		4	Vanderburg	2	1	2	4			7

INDIANA—Continued.

PROPORTIONATE DEPTHS—Continued.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Vermilion	2	1	3	....	....	....	4	Wells	1	....	3	1	....	....	4
Vigo	3	1	5	....	....	....	6	White	4	1	9	3	....	....	13
Wabash	3	....	1	8	3	....	12	Whitley	6	3	10	7	....	....	20
Warren	4	2	7	1	4	1	15								
Warrick	5	5	12	....	....	....	17	88 counties	312	137	549	180	60	13	939
Washington	5	1	4	10	1	....	16	Per cent	....	14.6	58.5	19.2	6.4	1.3	....
Wayne	5	1	9	3	4	....	17								

Remarks by reporters:

Adams County: "Dug wells are failing, but the supply in the limestone is holding out." Allen County: "A few flowing wells have failed or nearly so." Bartholomew County: "About 20 drilled wells were pumped dry on account of a deep well at ice plant; about 90 per cent of the springs have failed since use of the drilled wells began." "Have known this country 86 years; the water has sunk in that time about 3 feet." (Joseph Sternbarger, Edinburg). Blackford County: "All dug wells have failed." "Nearly all the dug wells have failed." Boone County: "In 1890 all wells were dug; now almost all are drilled; since 1890 water has gone down in the earth from 5 to 8 feet." Carroll County: "Before 15 years ago there were many good flowing springs; these are practically all dried up." "Two springs have failed considerably in the last few years; also one well entirely." Clark County: "Wells located by water witches; fact." Clinton County: "Most surface wells have gone dry, and drilled wells are now made." Crawford County: "Some partial failures in springs, the greatest differences being in those that showed the greatest flow in early settlement." Daviess County: "The past month has been extremely wet, and most of the wells have filled; one well failed last year." Dekalb County: "The water level has not varied in the past 30 years." "Nearly all dug wells are dry; the water level has been lowered by draining." Delaware County: "Since the city drilled 3 flowing wells a strong spring has failed." Fayette County: "Springs have failed entirely where located in the forest; the miserable, wanton, ignorant, pennywise destruction of the timber in the past 40 years has been the cause." Franklin County: "As timber gets less, so water gets less; one-third of springs never failing 40 years ago are dry." Fulton County: "The wells formerly were dug; as the country became cleared up these wells went dry and were replaced by drilled wells 50 to 100 feet deep." Gibson County: "A few wells have gone dry, attributed to other wells being dug in the neighborhood." Greene County: "During summer of 1909, very dry, two springs have broken out and are still running." Hamilton County: "Dug wells are nearly all exhausted." "The water level has fallen from 5 to 10 feet on account of ditching and other improvements." Hendricks County: "Water level lowered by deep cut in Big Four Railway." "A number of shallow wells have either been abandoned or made deeper." Jackson County: "In 1908 a number of wells and springs went dry." Jay County: "The old dug wells are uncertain as to supply." Knox County: "Water level lowered about 10 feet on account of ditching." "Wells drained by a coal mine." Kosciusko County: "Ditching seems to have lowered the water to about the extent of the depth of the ditches." "A spring has broken out on a dry hillside." Lagrange County: "Water level has been lowered from 5 to 10 feet; it ranged from 2 to 20 feet; now from 8 to 30 feet." "No great change in water level, but people have sought better water by getting it farther from the surface; some springs originally used have gone dry." Lawrence County: "Spring and summer rains have raised water." Marion County: "I dug a well 24 feet deep and my spring went dry for 2 years, then spring started and well went dry; deepened well 49 feet and both have water." Marshall County: "A spring came about 6 years ago; has failed a little this dry summer." Martin County: "Several springs broke out on the hillsides since the country

was cleared and farmed." Montgomery County: "The water level has been lowering through tile ditching." "Water does not stand so high by about one-third." Morgan County: "Fifty years ago numerous springs flowed; now all are extinct." Newton County: "Water has lowered from 6 to 10 feet; some dug wells have gone dry." "The old surface wells are nearly all abandoned, as many of them became insanitary, and a third dried up, due to drainage." Orange County: "Some springs and wells go dry, due to woodland being cleared up." Owen County: "Many springs have failed in the past 3 years." Porter County: "Stage of water in wells (near Lake Michigan) affected by direction of wind; a large spring dried by drainage." Pulaski County: "Original wells were all dug and have all been abandoned; ditching has lowered the surface water." Putnam County: "Thirty to forty years ago the water basin was 15 feet deep, now it is 40 feet." Ripley County: "One spring failed, but another has sprung up about 200 feet distant." Switzerland County: "There was 50 years ago a spring that furnished water for the neighborhood, but it has been dry for 30 years, while down the hollow some 60 rods one started up that gives an ample supply for stock." Tipton County: "Some of the dug wells are failing." Vanderburg County: "An asylum has a drilled well very deep which has caused dug wells to go dry." Vermilion County: "Since this country has been entirely tiled, the water level is considerably lower." Wabash County: "The water that can be depended on in dry weather is 50 feet deeper than it was 40 years ago." Wayne County: "A large number of dug wells have been abandoned as the water table generally is several feet lower than it used to be." Whitley County: "Nearly all the springs and dug wells have gone dry since the country has settled up and the forests have been cleared away and the low places drained for cultivation." "Very few open wells; they all failed when the country was ditched." "When a little stream was dredged about 25 years ago, every well within a mile of it had to be lowered from 20 to 40 feet." "Several dug wells abandoned on account of failure of water; springs are failing and none are strong as they were 50 years ago."

The observations of reporters in Indiana as in some other States bring out clearly the interdependence not merely of wells and springs but also of streams, ponds, etc.; i. e., they establish the unity of the subsoil reservoir. Some of the relations (e. g., those involved in the starting of springs in droughts) are treated in later pages.

IOWA.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Adair	*a* 9	1893	9	38.2	9	18.4	9	19.6	9	3	10	....	.....	9	18.7
Adams	*a* 15	1891	15	38.4	15	12.4	8	6.1	8	1	4	7	40	15	27.5
Allamakee	*b* 19	1892	20	291.8	20	72.7	16	72.4	16	....	.....	3	47	20	221.4
Appanoose	*a* 9	1879	9	41.6	9	14.2	9	14.2	9	....	.....	....	.....	9	27.3
Audubon	*a* 8	1897	8	25.6	8	15.2	6	11	6	....	.....	6	37	8	15
Benton	*a* 11	1890	12	24	11	5.5	12	7.3	11	....	.....	3	7	12	16.5
	b 10	1897	10	195.9	6	176.8	9	129	6	....	.....	1	5	9	66.4
Blackhawk	*a* 4	1877	4	23	4	7.7	4	6.5	4	....	.....	1	5	4	16.5
	b 2	1900	2	132.5	2	90	2	85	2	....	.....	1	10	2	47.5
Boone	*a* 2	1880	2	42.5	2	22.5	2	17.5	2	....	.....	1	10	2	25
	b 3	1891	3	166.7	3	136.7	3	126.7	3	....	.....	1	30	3	40
Bremer	*a* 4	1876	6	40.5	4	12	6	19.8	4	....	.....	1	4	6	20.7
	b 19	1893	20	128.9	20	83.9	17	92.6	17	....	.....	5	27	20	44.3
Buchanan	*a* 3	1878	3	35.7	3	9	3	6.3	3	....	.....	2	8	3	29.3
	b 9	1894	11	148.3	9	90.1	11	79.6	9	....	.....	2	15	11	68.6
Buena Vista	*a* 6	1891	6	45.7	6	22.5	6	12.3	6	....	.....	4	61	6	33.3
	b 1	1892	1	162	1	10	1	10	1	....	.....	....	.....	1	152
Butler	*a* 8	1885	10	28.7	10	8.9	7	10.1	7	....	.....	....	.....	10	19.8
	b 16	1892	20	131.6	18	32.7	19	30	18	....	.....	9	34	19	98
Calhoun	*a* 25	1894	30	48.6	25	33.1	29	27.2	24	....	.....	9	111	30	21.4
	b 8	1895	9	191.9	6	150	9	120	6	....	.....	....	.....	9	71.9
Carroll	*a*	.....	2	30	.....	.....	2	6.5	0	....	.....	....	.....	2	23.5
	b 6	1892	6	106.7	6	57.3	4	54.7	4	....	.....	1	15	6	51.8

IOWA—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Cass	a 7	1877	11	38.5	7	17.1	11	7.6	7			5	55	11	30.8
	b 12	1894	13	138.1	11	34.6	11	37.4	9			1	10	13	103.4
Cedar	a 1	1877	1	30	1	5	1	0	1			1	5	1	30
	b 4	1888	4	88.7	2	50	4	41.5	2			1	4	4	47.2
Cerro Gordo	a 5	1890	5	31	4	9.7	5	8	4			3	3	5	23
	b 6	1899	6	76.2	6	49.8	6	49.8	6	1	5	1	5	6	26.3
Cherokee	a 10	1892	10	45.5	10	27.2	10	20.6	10			5	66	10	24.9
	b 2	1904	2	300	2	175	2	162.5	2			1	25	2	137.5
Chickasaw	a		1	56			1	6	0					1	50
	b 1	1895	2	105	1	50	2	40	1			1	10	2	65
Clarke	a 11	1891	11	34.7	9	15.9	11	12.5	9			2	17	11	22.2
Clay	a 12	1884	13	33.1	9	10.4	13	7.9	9			3	17	13	25.2
	b 2	1904	2	217.5	1	75	2	42.5	1					2	175
Clayton	b 5	1891	8	178.4	7	78.1	8	75	7			3	27	8	103.4
Clinton	a 2	1908	4	35.2	3	20.7	4	17.2	3			1	8	4	18
	b 20	1894	21	139.5	19	68.5	17	51.2	15			5	30	21	74.9
Crawford	a 10	1892	10	43.3	9	10.6	7	11.6	6	1	1	2	6	10	32.4
Dallas	a 12	1888	12	32.1	12	22.1	12	13.3	12			9	105	12	18.7
	b 10	1897	10	149.4	9	116.1	10	99	9			6	95	10	50.4
Davis	a 2	1895	4	31.5	2	16.5	4	11.5	2					4	20
	b 4	1905	5	187	5	141	5	139	5			1	10	5	48
Decatur	a 4	1890	6	31.8	6	11	6	10	6			2	6	6	21.8
Delaware	a 1	1905	1	15			1	3	0					1	12
	b 8	1889	11	115.6	11	57.3	11	53.5	11			7	41	11	62.1
Des Moines	a 5	1855	5	31.6	4	18.2	5	13	4			4	15	5	18.6
	b 7	1897	7	109.4	6	54	7	54.9	6					7	54.6
Dickinson	a 7	1892	7	24.6	7	9.3	7	6.9	7			4	17	7	17.7
	b 6	1892	6	151.2	4	103.7	6	79.2	4					6	72
Dubuque	a 4	1864	4	24.5	4	7.2	3	6.3	3			2	5	4	18.5
	b 8	1892	8	228.5	8	79.6	5	33.4	5			3	65	8	157
Emmett	a 3	1899	7	40.6	3	25	7	8.1	3			3	40	7	32.4
	b 5	1899	7	157.3	3	66.7	6	63.3	3			1	25	6	106.3
Fayette	a 5	1887	5	26	5	11	5	7.8	5			2	16	5	18.2
	b 14	1892	14	98.5	14	44.9	14	42.9	14			4	28	14	55.6
Floyd	a 3	1874	3	19.3	3	4.7	3	0	3			3	14	3	19.3
	b 11	1886	11	121.1	5	22.2	11	37.5	5			2	13	11	83.5
Franklin	a 2	1877	2	44	2	28.5	1	25	1					2	15.5
	b 12	1894	14	108.8	13	59	14	51.1	14			9	97	14	57.7
Fremont	a		1	18	1	12.5	1	9	1			1	3.5	1	14.5
Greene	a 7	1883	7	32	4	8.5	7	11.3	4			3	30	7	20.7
	b 6	1892	7	161.3	5	108.8	7	125	5			2	9	7	36.3
Grundy	a 8	1877	8	40.9	6	18.2	8	12.5	6			5	49	8	28.4
	b 17	1897	17	168.1	16	91	16	83	15			5	38	17	81.1
Guthrie	a 25	1888	25	35.4	25	12.9	22	12.7	22	2	7	9	40	25	24
	b 10	1898	11	116.6	10	39.4	7	48	6			1	5	10	65.4
Hamilton	a 7	1889	7	45.7	7	20.4	7	15	7			4	38	7	30.7
	b 9	1895	10	151.1	9	93.4	10	86.8	9	1	10	2	23	10	64.3
Hancock	a 5	1887	7	27.7	7	11.3	7	7.6	7			6	26	7	20.1
	b 10	1901	10	92.4	10	68.8	10	65.8	10			2	30	10	26.6
Hardin	b 10	1897	10	114.9	10	79.3	10	76.8	10			2	25	10	38.1
Harrison	a 13	1896	13	26.3	9	6.6	13	5.3	9	1	1	5	21.5	13	21
	b 2	1897	2	112.5	2	55	2	52.5	2			1	5	2	60
Henry	a 14	1869	16	32.9	14	15.1	16	10.6	14			12	49	16	22.2
	b 3	1898	8	165.6	4	67.5	4	66.2	4			1	5	4	125
Howard	a 12	1879	12	30.6	12	7.6	12	4.8	12			11	33.5	12	26.2
	b 6	1890	6	133.8	3	61.3	5	55.2	2			1	5	6	87.3
Humboldt	a 3	1896	5	34.4	5	12.8	5	11.6	5			2	6	5	22.8
	b 10	1893	11	93.7	11	32.9	11	32.9	11					11	60.9
Ida	a 9	1895	11	24.6	11	5.8	8	4.7	8			5	9	11	19.6
	b 1	1896	1	100	1	45	1	40	1			1	5	1	60
Iowa	a 8	1871	13	34.8	10	7.7	13	5.3	10			4	18	13	29.5
	b 5	1897	10	220.3	5	211	7	177.9	5					7	64
Jackson	a 4	1883	5	28.2	4	10.2	5	6.2	4			4	17	5	22
	b 19	1891	21	173.6	19	51.3	21	53.8	19	1	10	2	10	21	119.8
Jasper	a 11	1880	17	29.5	12	13.6	17	8.1	12			11	62	17	21.4
	b 6	1895	6	250.7	6	168.3	3	173.3	3					6	82.3
Jefferson	a 14	1874	16	45.5	13	14.6	16	9.6	13			7	55	16	35.9
Johnson	a 6	1873	9	26.6	9	16.4	6	6.2	6			2	10	9	11.3
	b 11	1894	11	157.4	8	59.4	11	69.1	8			2	15	11	88.3
Jones	a		1	50	1	5	1	0	1			1	5	1	50
	b 12	1895	17	141	12	56.7	10	58	10			4	65	12	107
Keokuk	a 19	1883	23	31.6	18	9.4	23	6.9	17			11	74	23	24.7
	b 2	1893	9	166.8	1	80	2	85	0					3	38.7
Kossuth	a 6	1889	6	56.8	6	33.7	6	30.2	6			2	21	6	26.7
	b 10	1898	12	153	10	99.1	7	113.9	5			1	18	12	46.2
Lee	a 7	1862	15	41.1	7	26.1	15	16.1	7			1	1	15	25
	b 5	1899	7	209.1	7	148.6	5	118	5			3	250	7	96.3
Linn	a 6	1877	8	26.4	4	10.7	8	6.9	4			1	5	8	19.5
	b 11	1895	13	110.2	12	55.9	12	40.9	11			5	110	13	65.5
Louisa	a 4	1875	5	27.9	5	10	5	9.2	5	1	10	2	14	5	18.7

IOWA—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Falls.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
	b 2	1892	5	111.8	2	22.5	5	27	2					5	84.8
Lucas	*a* 7	1890	7	30	7	9.9	7	8.9	7			2	7	7	21.1
Lyon	*a* 12	1892	12	31.6	11	15.4	12	10.1	11			8	53	12	21.5
	b 1	1897	1	300	1	160	1	160	1					1	140
Madison	*a* 13	1883	16	42.6	12	17.6	13	12.8	9	2	12	3	24	16	26.2
Mahaska	*a* 15	1885	19	28.2	13	11.2	15	9.3	9			3	23	19	19.3
	b 1	1910	3	150			3	65	0					3	85
Marion	*a* 10	1878	16	31.5	11	10.2	15	7.3	10			8	42	16	24.5
	b 4	1904	5	199.2	2	75	5	87	2					5	112.2
Marshall	*a* 1	1885	1	40	1	10	1	10	1					1	30
	b 8	1889	8	174.2	8	103.1	8	106.9	8	2	30			8	67.4
Mills	*a* 6	1886	6	58.3	5	12.7	6	13.9	5					6	44.4
Mitchell	*b* 8	1889	10	115	5	48	10	59.8	5			1	2	10	55.2
Monona	*a* 9	1892	13	33.4	5	6.6	13	10.3	5			4	10	13	23.1
	b 3	1882	5	115.8	2	95	5	34.8	2			2	60	5	81
Monroe	*a* 6	1888	9	31.1	6	16.2	9	12.1	6			4	12	9	19
Montgomery	*a* 13	1887	14	37.1	13	16	13	15.1	12			5	20	14	21.9
	b 4	1897	4	123.2	4	34.5	4	34.5	4					4	88.7
Muscatine	*a* 8	1880	8	36.9	7	7.4	8	9.1	7	1	4	2	18	8	27.7
	b 2	1901	2	250	2	104	1	168	1					2	146
O'Brien	*a* 12	1894	13	37	9	12.1	13	7.1	9			6	32	13	29.9
	b 7	1894	8	278.9	3	85	7	107.9	3			2	170	7	153.7
Osceola	*a* 11	1893	11	46.5	11	21.4	11	21.2	11	1	10	4	12	11	25.4
	b 2	1896	5	229.6	2	180	5	120	2			1	30	5	109.6
Page	*a* 13	1884	15	39.7	13	19.4	15	13.5	13			6	70	15	26.2
	b 2	1895	2	165	1	140	1	140	1					1	40
Palo Alto	*a* 4	1897	4	53.2	4	31.5	4	23	4			3	34	4	30.2
	b		2	130			2	40	0					2	90
Plymouth	*a* 7	1893	7	43.6	7	16.3	7	9.9	7			4	45	7	33.7
	b 1	1902	1	235	1	160	1	160	1					1	75
Pocahontas	*a* 8	1891	12	43.3	8	12.9	12	9.8	8	2	9	2	10	12	33.5
	b 5	1898	10	196.1	8	114.4	10	135.5	8			2	35	10	60.6
Polk	*a* 21	1890	24	46.2	20	21.9	24	14.4	20			17	137	24	31.8
	b 4	1889	4	284	2	200	4	156.2	2			1	100	4	127.7
Pottawattamie	*a* 11	1889	16	38.6	12	16.3	14	16.9	10	1	2	3	6	16	22.2
	b 3	1902	4	63.5	3	20	4	18.2	3			3	12	4	45.2
Poweshiek	*a* 8	1893	8	42.7	7	29.4	5	15.8	4					8	15.7
	b 1	1901	1	222	1	110	1	110	1					1	112
Ringgold	*a* 21	1890	25	30.1	20	11.9	25	10.9	20			12	74	25	19.2
	b		1	160			1	80	0					1	80
Sac	*a* 2	1884	9	29.4	3	10.3	8	4.5	2			2	7	9	22.8
	b		1	150			1	75	0					1	75
Scott	*a* 1	1876	1	22	1	11			0					1	11
	b 5	1896	5	113.6	5	68.6	1	105	1					5	45
Shelby	*a* 5	1891	5	38.2	5	12.6	5	13.5	5	2	4.5			5	24.7
	b 3	1893	3	76.7	3	39.2	3	40	3	1	2.5			3	36.7
Sioux	*a* 10	1897	10	42.3	10	15.2	10	13.3	10	1	4	6	23	10	29
	b 4	1906	4	127	4	28.2	4	23	4			1	21	4	104
Story	*a* 6	1889	6	22.7	6	4.7	6	1.8	6			5	17	6	20.8
	b 12	1894	12	191.5	9	85.4	12	123.7	9					12	67.7
Tama	*a* 5	1893	7	34.9	7	15.9	7	14.4	7			2	10	7	20.4
	b 6	1902	8	265.9	8	199	5	196.8	5	1	5			8	66.2
Taylor	*a* 13	1887	13	46.5	13	26.2	13	13.2	13			13	170	13	33.3
	b 1	1909	1	64	1	50	1	30	1			1	20	1	34
Union	*a* 11	1892	11	38.4	8	18	11	12.8	8			7	77	11	25.5
Van Buren	*a* 15	1872	15	29.5	15	15.4	15	14.7	15	1	5	3	15	15	14.8
	b 1	1895	1	175	1	75	1	75	1					1	100
Wapello	*a* 3	1886	3	36.7			3	3.3	0					3	33.3
Warren	*a* 7	1887	9	31.9	9	9.8	9	6.7	9			7	28	9	25.2
	b 2	1895	2	138	1	20	1	14	1			1	6	1	102
Washington	*a* 7	1875	7	45.6	6	24.2	7	16.1	6			3	41	7	29.5
	b 3	1899	3	115.7			3	79	0					3	36.7
Wayne	*a* 18	1883	21	37.4	17	15.9	21	13.1	17			8	36	21	24.3
Webster	*a* 5	1889	6	41.2	5	24.2	6	19	5			3	27	6	22.2
	b 1	1894	1	112	1	25	1	25	1					1	87
Winnebago	*a* 4	1897	4	38.2	4	13.2	4	4.2	4			3	36	4	34
	b 6	1902	6	136	6	108.2	6	101.5	6			2	40	6	34.7
Winneshiek	*a* 4	1882	4	37	4	16.7	4	7.5	4			4	37	4	29.5
	b 15	1892	24	143.6	19	40.4	13	40.8	8			4	30	24	104.5
Woodbury	*a* 23	1896	24	35.5	23	17	24	16	23			5	16	24	19.5
	b 1	1896	2	158.5	1	52	2	76	1					2	82.5
Worth	*a* 6	1889	7	28.3	6	8	7	3.6	6			6	38	7	24.7
	b 5	1899	9	95.3	5	84.2	9	66.1	5			1	6	9	29.2
Wright	*a* 9	1880	9	38.6	9	20.8	9	17.3	9			6	31	9	21.2
	b 17	1894	17	104.5	16	85	17	82.7	16			2	13	17	21.8
Total	*a* 768	1875.0	895	36.1	749	15.4	852	11.8	711	20	83.5	373	2,503.5	895	24.1
	b 535	1894.8	632	153.0	506	77.8	551	74.4	449	7	62.5	128	1,831.0	607	78.7
Aggregate	1,303	1887.0	1,527		1,255		1,403		1,160	27	146	501	4,234.5	1,502	46.1

IOWA—Continued.

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Adair	4	1	8	.....	.....	.....	9	Jones	6	.....	1	3	3	6	13
Adams	5	.....	8	7	.....	.....	15	Keokuk	9	2	16	8	.....	.....	26
Allamakee	7	1	1	2	1	15	20	Kossuth	7	3	4	9	1	1	18
Appanoose	4	2	5	2	.....	.....	9	Lee	6	.....	12	5	2	3	22
Audubon	3	3	5	.....	.....	.....	8	Linn	9	1	7	8	4	1	21
Benton	8	5	6	4	6	.....	21	Louisa	5	1	4	.....	5	.....	10
Blackhawk	2	.....	4	2	.....	.....	6	Lucas	3	2	4	1	.....	.....	7
Boone	2	.....	4	.....	1	.....	5	Lyon	5	2	8	1	1	1	13
Bremer	9	8	4	8	5	1	26	Madison	6	2	11	2	1	.....	16
Buchanan	5	.....	2	6	6	.....	14	Mahaska	6	3	14	2	3	.....	22
Buena Vista	2	.....	4	2	.....	1	7	Marion	7	1	13	3	2	2	21
Butler	11	1	7	7	6	8	29	Marshall	3	1	2	2	3	1	9
Calhoun	12	5	20	9	2	3	39	Mills	2	.....	2	3	1	.....	6
Carroll	4	.....	3	2	3	.....	8	Mitchell	4	.....	5	2	1	2	10
Cass	6	.....	5	7	6	6	24	Monona	6	2	8	5	2	1	18
Cedar	2	.....	1	3	1	.....	5	Monroe	3	2	5	2	.....	.....	9
Cerro Gordo	4	1	7	3	.....	.....	11	Montgomery	5	2	11	3	.....	2	18
Cherokee	4	1	6	3	1	1	12	Muscatine	4	1	3	4	1	1	10
Chickasaw	2	.....	.....	2	1	.....	3	O'Brien	4	.....	9	5	3	3	20
Clarke	4	.....	9	2	.....	.....	11	Osceola	5	1	8	2	3	2	16
Clay	5	1	9	3	.....	2	15	Page	6	2	8	6	.....	.....	16
Clayton	3	.....	1	1	2	4	8	Palo Alto	2	.....	2	2	2	.....	6
Clinton	9	2	6	5	5	7	25	Plymouth	5	.....	3	4	1	.....	8
Crawford	3	3	4	.....	3	.....	10	Pocahontas	7	3	6	5	8	.....	22
Dallas	7	5	7	8	2	.....	22	Polk	10	1	9	14	2	2	28
Davis	3	1	3	3	2	.....	9	Pottawattamie	8	4	8	8	.....	.....	20
Decatur	2	1	4	1	.....	.....	6	Poweshiek	3	3	5	.....	.....	1	9
Delaware	4	.....	2	5	5	.....	12	Ringgold	8	3	17	5	1	.....	26
Des Moines	5	.....	6	3	3	.....	12	Sac	3	2	4	3	1	.....	10
Dickinson	4	2	7	2	1	1	13	Scott	2	1	2	.....	3	.....	6
Dubuque	4	.....	4	1	1	6	12	Shelby	3	2	3	2	1	.....	8
Emmett	4	1	2	5	2	3	13	Sioux	5	.....	5	5	2	2	14
Fayette	7	1	6	6	5	1	19	Story	5	3	4	4	6	1	18
Floyd	4	.....	3	2	6	3	14	Tama	4	2	5	3	4	1	15
Franklin	6	.....	4	7	4	1	16	Taylor	6	.....	6	8	.....	.....	14
Fremont	1	.....	1	.....	.....	.....	1	Union	5	3	3	5	.....	.....	11
Greene	4	.....	10	3	1	.....	14	Van Buren	6	3	12	.....	1	.....	16
Grundy	6	1	4	9	8	3	25	Wapello	1	.....	2	1	.....	.....	3
Guthrie	12	5	19	5	4	2	35	Warren	6	.....	7	2	.....	1	10
Hamilton	6	.....	5	9	1	2	17	Washington	3	2	4	4	.....	.....	10
Hancock	5	3	9	4	1	.....	17	Wayne	7	5	9	6	1	.....	21
Hardin	5	.....	5	3	2	.....	10	Webster	3	.....	6	.....	1	.....	7
Harrison	5	4	7	3	1	.....	15	Winnebago	4	.....	4	6	.....	.....	10
Henry	7	1	14	3	.....	2	20	Winneshiek	10	3	6	6	2	11	28
Howard	4	.....	8	6	2	2	18	Woodbury	9	7	15	3	.....	1	26
Humboldt	6	.....	6	3	7	.....	16	Worth	4	2	8	6	.....	.....	16
Ida	5	.....	10	2	.....	.....	12	Wright	8	9	12	3	2	.....	26
Iowa	7	1	7	7	5	.....	20								
Jackson	8	.....	6	3	3	14	26	99 counties	517	150	642	373	198	139	1,502
Jasper	6	2	14	3	2	2	23	Per cent	.....	10.0	42.7	24.8	13.2	9.3	.....
Jefferson	5	.....	9	4	3	.....	16								
Johnson	7	2	9	2	4	3	20								

Remarks by reporters:

Adair County: "No change of water levels for the last 20 years." "A spring failed; the time is not far off when our sheet water will be exhaused and drilled wells will have to replace them." Adams County: "Two wells have gone dry; the water has lowered 10 to 20 feet." Allamakee County: "The ground level of water has remained the same for about 20 years; about that time all wells had to be redrilled; some springs have failed permanently since the land has been tilled; first settlement in 1850—all springs and surface water then." "In many places springs have gone dry; many of the wells have been sunk deeper one or more times owing to water level lowering." Appanoose County: "It is generally conceded that the wells afford more water than they did in early days; springs have broken out in late years also." Audubon County: "A great number of wells, varying in depth from 10 to 25 feet, have been abandoned because they did not furnish the water needed." Benton County: "Formerly wells were all dug 20 to 40 feet deep and walled with stone or brick, but now they are nearly all abandoned and drilled wells 70 to 160 feet have taken their place." Blackhawk

County: "Most dug wells have given out and are replaced by wells driven into solid rock." Bremer County: "No dug wells for the last 20 years; drilled wells have been made." Buchanan County: "Dug wells have failed this summer." "Wells of a depth of 20 feet have little water, consequently people are making drilled wells, going into limestone." Butler County: "Dug and driven wells frequently have gone dry." "Deep wells have not changed; the surface-water well is a thing of the past." Calhoun County: "Wells from 10 to 25 feet mostly dry." Carroll County: "Nearly all wells drilled; in the early settling the wells were all dug and only surface water was used; a great number of these surface wells failed." Cass County: "All shallow wells have been abandoned; most of the shallow wells and springs began to fail 25 years ago." "In the seventies wells were dug or bored 30 to 35 feet, with 10 to 15 feet of water; about 1885 the water level began to go deeper and the wells were dug deeper but soon failed, when we had to resort to deep-drilled wells; these are proving satisfactory and permanent." Cedar County: A dug well 30 feet deep had plenty of water from 1877 to 1886, when it went dry and a deep well was put down. Clarke County: "A strong spring broke out this summer in rough pasture land, where water had never been known before." "Lots of wells are failing." Clayton County: "Some are sinking their wells deeper; springs are mostly dry." Clinton County: "Some springs have run dry; in some wells the water has gone down." Crawford County: "Part of the farm was covered with timber 15 years ago; at that time there were several springs, but since it was cleared none remain." Dallas County: "Forty-two years ago wells were only from 10 to 20 feet; nearly all are now dry; wells now drilled." "This season unusually dry; a good many wells dry or nearly so." Decatur County: "Some wells have been abandoned because of failure." "Wells were originally from 15 to 25 feet deep and were later drilled to over 100 feet." Dickinson County: "Have known the wells of Iowa for over 40 years; wells that once gave plenty of water have been abandoned years since." Dubuque County: "A strong spring disappeared and is only a dry run; a spring forming almost a creek and supplying many farms for 1½ miles is almost dry; a number of smaller springs have disappeared totally." "Of 116 springs that I have a knowledge of, all are dried up to date; there is a tendency in late years to drill wells deeper." Emmett County: "A great many wells have run dry." "Water supply is considerably lower; 15 years ago all were dug wells, but these have given out in most places; as sloughs are drained the water goes down." Fayette County: "Wells drilled and bored; surface wells discarded years ago; some springs go dry in summer; since the timber has been cut and the land plowed the moisture is not held at the surface to supply them." Franklin County: "The water level is slowly but surely lowering, and unless our people take this matter up and do something to counteract the cause it does not require an inspired mind to discern the outcome." Greene County: "In 1863 the ground was covered with a heavy growth of vegetation which held the water; as the country became settled and the lands cultivated the water cut out surface ditches which lowered its level, and in the last 10 years tiling has been put in; the surface wells have long been abandoned," and deep wells have been put down. "The general water level is about 12 feet lower than in 1890; the sinking of the water level has been gradual." Grundy County: "Our old dug wells went by the board 18 or 20 years ago; we now drill from 60 to 200 feet." Guthrie County: "Wells are dug deeper." Hamilton County: "Thirty years ago all wells were dug from 10 to 30 feet deep; they have now all failed." Hancock County: "A number of wells ranging from 25 to 40 feet have gone dry." "These wells all made because the old ones went dry." Harrison County: "In the hills the water level has lowered and many springs have gone dry in the last 50 years." "The water level has settled from 5 to 12 feet in the last 40 years." "Several dug wells have been abandoned. Henry County: "Think the water has not changed in the last 50 years; one well has grown stronger with use." "Springs seem to keep up their original flow; one

well unchanged for 40 years, another lowered; thought to be by pumping of city wells" nearby. Howard County: "Thirty-five years ago we got water with a spade from 15 to 20 feet; after the ground was trampled by cattle these wells gave out and we bored with augers 40 to 50 feet; these gave out, then came drilling 50 to 200 feet, and these wells hold." A 25-foot well dug in 1856 failed about 1885; was drilled to 76 feet and yields abundant water. A 35-foot well drilled in 1880 ran low in 1887, was deepened to 150 feet and contains 50 feet of water." Humboldt County: "Some wells drilled in low places for drainage which will take down water about as fast as it runs into them." "Old wells went dry this season." Ida County: "The only difference is that it is harder to get good wells." Iowa County: "Three springs that were good for all purposes have gone entirely dry; very few wells of less than 90 feet are in use." "In years past we got water from wells 50 to 60 feet deep, but no one depends on them now; we have drilled wells from 160 to 200 feet deep." Jackson County: "Many of the early dug wells which furnished at one time an abundant supply of water are either abandoned or have been drilled deeper; many of the springs have gone dry." "Many springs have gone dry or decreased in flow, and many wells have been drilled deeper; there is no doubt the water level has lowered since the country was settled." "A large number of springs (70 per cent) have gone dry in the last 40 years; we claim the many windmills [used on deeper wells] have caused it." "Springs are nearly all dry, very few left; this was a timbered country [now cleared]." Jasper County: "We had springs in an early day, but they have failed." "We have a few everlasting springs." "The dug wells in an earlier day were usually 20 to 26 feet, but now to get a good well we have to dig from 30 to 40 feet; drilled wells from 180 to 265 feet." Jefferson County: "The water in wells has lowered from 5 to 10 feet in the last 25 years." "A spring started in 1894, a dry season, and has been running ever since." "Many wells dug by the early settlers (1840 to 1860) afforded a good supply until live stock came; then deeper wells were sunk." Johnson County: "The original shallow or dug wells all or nearly all abandoned." "Nearly all shallow wells have failed; very few springs to be found of late years—formerly there were many." Jones County: "A spring ceased to flow about 12 years ago." Keokuk County: "With very few exceptions dug or shallow wells are all going dry, and farmers depend on deep-drilled wells." "Fifty years ago water could be obtained at 12 to 15 feet, but now on the same farm 50 feet is nearer the average." "Nearly all of the shallow wells have failed." Lee County: "No material change in depth of water during the last 20 years." "See no difference in my time (35 years) in water stage." Linn County: "The water level has sunk in the last 25 years 20 feet." Louisa County: "Surface wells 20 to 40 feet have nearly all given out, and it became necessary to have wells drilled 70 to 180 feet." "Every farmer has a drilled well from 90 to 140 feet; the water in upper strata failed 10 to 15 years ago." Lyon County: "Some new springs have started in the last 3 to 5 years." "Wells lower than ever before." Madison County: "Two springs started in recent years." "The first supply of water has failed; we now have to go 40 to 100 feet." Mahaska County: "Water is a good deal lower in wells than it was 40 years ago under like conditions." "We now have to go 35 to 100 feet to get a good well [old wells 20 feet]". Marion County: "Wells that formerly gave plenty of water have now been made deeper [by 10 feet] to produce the same amount." "A spring started this summer that will water 100 head of cattle." "A well deepened 15 feet in 1888; a good spring has been dry for years." Marshall County: "Shallow wells are failing." Mills County: "Water in wells has not changed for 40 years." Monona County: "Some of our old springs are dry." "Dug wells can not be depended on, as they will go dry in a year or two." Monroe County: "The old way of digging wells with a spade is past; wells drilled 40 to 60 feet." Montgomery County: "Shallow wells in a great many cases have gone dry; have to put down drilled wells." "When the country was first settled, surface wells were 15 to 25 feet, but these have all dried out, and most wells are now 50 to 100 feet." O'Brien County: "Water could be

obtained at 16 to 25 feet from 1871 to 1890; then for about 12 years at from 40 to 80 feet for dug wells and 175 to 400 feet for drilled." Page County: "The water level is several feet lower than 30 years ago; a good many wells have failed; of late years wells are made deeper." Pocahontas County: "Very little change in deep wells, but in surface wells the water level has lowered." "Twenty years ago the water was much above present levels, and no well was much more than 35 feet deep; now wells have to be sent down from 50 to 75 feet deeper." "Thirty-five years ago the water was nearer the surface." "No particular change in the last 25 years." Polk County: "Surface water has deepened owing to tiling, but the deeper wells seem about the same for the last 40 years." "Twenty-five years ago most wells were dug 25 to 40 feet, now bored or drilled 50 to 80 feet." "A marked shortage of water in the shallow wells." Pottawattamie County: "The water level seems to be gradually lowering; the drilled wells are not affected." Ringgold County: "Thirty-five years ago we got plenty of water at about 20 feet; now we go about 60 feet." "Am sure the water level is getting lower; two wells of 16 and 20 feet have been abandoned because of failure—they used to furnish an abundance of water." Sioux County: "Springs have nearly doubled in the last 20 years in number and also in flow." Story County: "Water in the original wells gradually lessened and they have been mostly abandoned." "Surface wells, 5 to 40 feet, of 20 years ago all dry; in the drilled wells of later date the head of water is pumped down more easily than it used to be." Tama County: "Surface wells not certain for a supply of water." Taylor County: "Where land is extensively tiled the water is failing and many have to go deeper." "Thirty years ago we got good wells at 20 to 30 feet; now we go 60 to 100 feet; many springs have failed." Union County: "Forty years ago we got plenty of water almost anywhere at a depth of 20 feet, now we have to go 60 and 100 feet, and often find no water." Wapello County: "In 34 years 3 springs of running water have gone dry." Warren County: "The water level became about 5 feet lower about 15 years ago; the cause was supposed to be a term of dry years." "Half the wells have failed, and springs have stopped running in many cases." Wayne County: "Lots of abandoned wells that had plenty of water for a while, then failed." Winnebago County: "Water in wells receded about 20 feet in the dry summer, while a number of other wells failed entirely." Winneshiek County: "General water supply is lower; numerous springs have gone entirely dry." Worth County: "Nearly all dug wells have gone dry." "All shallow wells are dry." Wright County: "A well long good at 25 feet went dry and had to be sunk to 128 feet." "Many flowing wells have lowered their water level." "Fifty years ago all early settlers dug wells 8 to 20 feet and for years had plenty of water; later they bored and drilled wells to a depth of 70 feet and secured plenty of water; now most wells are drilled into rock, some of them 300 feet deep."

The foregoing remarks (with others not quoted) indicate (1) that the relation of subsoil water to the surface varies in different sections of the State, and also according to local physiography; (2) accordingly, that while many reporters note no change in water level, and a few discern a rise, the majority record decided lowering; and (3) that the ratio of remarks on stationary and lowering water conforms fairly with the figures for the State furnished by the entire body of reporters. The striking general fact for the State as a whole is that settlers found ample water supplies at a depth seldom exceeding 20 feet, and doubtless averaging barely 15 feet; while now (25 to 75 years later) the mean depth of dug wells has increased to 36 feet, and the mean depth to water table in both dug and drilled wells (many of the latter having replaced the former) to 46 feet.

To one fairly familiar with the State since the settlement of the eastern counties the records and remarks jointly indicate a mean lowering of the subsoil water level during an average of 50 years that can hardly be put at less than 20 feet, or considerably more than the minimum rate of about 1.6 feet per decade derived from the records alone.

KANSAS.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Allen	*a* 5	1885	5	31.2	5	11.8	5	14.8	5	3	20	1	5	5	16.4
	b	.....	1	90	1	40	1	80	1	1	40	....	.....	1	10
Anderson	*a* 13	1884	14	24.6	12	9.1	14	9.6	12	6	14	3	8	14	15
	b	.....	2	87.5	1	100	2	75	1	....	.....	....	.....	2	12.5
Atchison	*a* 6	1891	9	38.7	9	11.9	9	11.9	9	....	.....	....	.....	9	26.7
Barber	*a* 17	1897	17	26.3	14	8.9	15	8.1	12	....	.....	3	6	17	18.4
	b 5	1906	5	95.4	3	14	5	35	3	....	.....	....	.....	5	60.4
Barton	*a* 4	1887	8	35.5	4	8.7	8	11.2	4	....	.....	....	.....	8	24.2
	b 7	1904	9	124.6	4	43.7	9	52.8	4	....	.....	....	.....	9	71.8
Bourbon	*a* 6	1870	6	19.7	6	6.8	6	5.5	6	....	.....	3	8	6	14.2
Brown	*a* 21	1880	23	40.3	20	10.7	20	12.1	17	4	28	3	6	23	29.2
	b 8	1890	11	83.2	5	16.8	11	28.4	5	....	.....	1	3	11	54.8
Butler	*a* 18	1880	19	39.5	18	13.5	19	13.4	18	3	15	3	9	19	26.1
	b 5	1883	6	80.8	5	31	6	35	5	1	20	....	.....	6	45.8
Chase	*a* 13	1886	15	27.8	13	8.6	15	7.6	13	....	.....	4	10	15	20.2
	b 2	1897	4	82.5	2	30	4	22.5	2	....	.....	1	5	4	60
Chautauqua	*a* 9	1893	9	29.4	9	13.4	9	12.4	9	....	.....	3	9	9	17
	b	.....	1	260	1	260	1	260	1	....	.....	....	.....	1	0
Cherokee	*a* 14	1878	16	27.9	14	9.7	16	10.5	14	4	20.5	....	.....	16	17.4
Cheyenne	*b* 6	1901	6	175.3	6	14.5	6	14.5	6	....	.....	....	.....	6	160.8
Clark	*a* 4	1894	4	29	4	6.9	4	8	4	1	4.5	....	.....	4	21
	b 4	1897	4	115.7	4	26.2	4	26.2	4	....	.....	....	.....	4	89.5
Clay	*a* 14	1882	18	44.2	11	10.7	17	11.7	10	1	13	3	9	18	32.8
	b 15	1885	16	107.7	16	35.6	16	35.3	16	....	.....	1	5	16	72.4
Cloud	*a* 8	1882	8	35.9	7	13.6	8	11.5	7	....	.....	3	11	8	24.4
	b 7	1895	7	108.4	7	44.6	7	44.3	7	1	10	1	12	7	64.1
Coffey	*a* 15	1885	19	23.1	13	5.8	19	7.3	13	6	29	....	.....	19	15.8
	b 1	1905	1	140	....	.....	1	100	0	....	.....	....	.....	1	40
Comanche	*a* 4	1897	4	44.5	4	16	4	15.2	4	....	.....	1	3	4	29.2
Cowley	*a* 16	1883	17	35.6	17	9.7	17	11.7	17	6	35	1	1	17	23.9
	b 3	1886	3	86.7	3	16.7	3	15.7	3	....	.....	1	3	3	71
Crawford	*a* 4	1886	4	19.7	4	11.7	4	12.2	4	1	2	....	.....	4	7.5
Decatur	*a* 7	1904	8	31.6	8	7.7	8	6.7	8	....	.....	2	8	8	24.9
	b 3	1899	3	132	3	10	3	10	3	....	.....	....	.....	3	122
Dickinson	*a* 10	1882	11	37	5	7.8	11	8.9	5	....	.....	5	17	11	28.1
	b 7	1892	8	96.4	7	17.9	8	17.5	7	....	.....	....	.....	8	78.9
Doniphan	*a* 11	1876	11	29.6	11	4.5	11	4.1	11	....	.....	5	4.5	11	25.5
	b 3	1898	3	163.3	....	.....	3	100	0	....	.....	....	.....	3	63.3
Douglas	*a* 9	1880	12	21.6	12	4.9	12	6.9	12	9	24	....	.....	12	14.7
Edwards	*a* 12	1898	12	32.2	6	16.2	12	11.3	6	....	.....	....	.....	12	20.9
	b 1	1909	1	100	....	.....	1	40	0	....	.....	....	.....	1	60
Elk	*a* 3	1895	7	22.7	3	15.3	7	8.6	3	....	.....	....	.....	7	14.1
	b 3	1890	3	117	3	45	3	43.3	3	....	.....	1	5	3	73.7
Ellis	*a* 12	1899	12	17.7	12	4	12	3.6	12	....	.....	5	5.5	12	14.1
	b 3	1909	5	419	3	325	5	210	3	....	.....	....	.....	5	209
Ellsworth	*a* 17	1878	19	25.7	17	4.5	17	4.3	15	2	7	7	13.5	19	21.7
	b 4	1901	5	128	4	28	4	38	3	....	.....	....	.....	5	93.6
Finney	*a* 9	1898	10	38.3	9	17.7	10	16.2	9	....	.....	....	.....	10	22.2
	b 2	1897	3	111.7	2	13	3	12	2	....	.....	....	.....	3	99.7
Ford	*a* 3	1897	4	30	3	7.7	4	7	3	....	.....	....	.....	4	23
	b	.....	2	105.5	1	93	2	56.5	1	....	.....	....	.....	2	49
Franklin	*a* 6	1872	9	21.8	6	5.2	9	5.3	6	1	1	....	.....	9	16.4
	b 2	1897	3	200	2	95	3	80	2	....	.....	....	.....	3	120
Geary	*a* 1	1856	2	50	2	8	2	10	2	2	4	....	.....	2	40
	b 7	1886	7	94.7	5	40	7	34.7	5	....	.....	....	.....	7	60
Gove	*a* 8	1894	9	35.9	9	6.9	7	6.5	7	1	0.5	....	.....	9	28.9
	b 7	1895	7	94.4	7	22.1	7	20.7	7	....	.....	2	10	7	73.7
Graham	*a* 2	1907	3	43.3	2	21	3	17.3	2	....	.....	....	.....	3	26
	b 6	1902	8	148.9	3	24	8	38.5	3	....	.....	....	.....	8	110.4
Grant	*b* 3	1905	3	218.3	3	25	3	25	3	....	.....	....	.....	3	193.3
Gray	*b* 5	1894	8	130	5	17	8	20.2	5	....	.....	1	3	8	109.7
Greenwood	*a* 9	1882	12	25.4	9	7.3	12	7.7	9	3	13	....	.....	12	17.7
Hamilton	*a*	.....	1	29	1	10	1	10	1	....	.....	....	.....	1	19
	b 6	1901	11	178.6	9	70	8	94.4	6	3	104	....	.....	11	107.8
Harper	*a* 3	1896	8	38	3	11.3	8	8.7	3	....	.....	....	.....	8	29.2
Harvey	*a* 14	1881	17	27.3	9	9.3	17	7.6	9	....	.....	....	.....	17	19.7
Haskell	*b* 5	1903	6	251	6	60.1	4	32.6	4	....	.....	....	.....	6	190.9
Hodgeman	*a* 3	1892	4	45.2	3	3.7	4	3.4	3	....	.....	1	0.5	4	41.9
	b 3	1898	4	106.5	3	10	4	13.7	3	....	.....	....	.....	4	92.7

KANSAS—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Jackson	*a* 4	1888	5	36.8	4	7.7	5	8	4	1	4			5	28.8
	b 1	1903	1	160	1	17	1	0	1			1	17	1	160
Jefferson	*a* 4	1893	8	35.2	3	6.3	8	11	3	1	5	1	1	8	24.2
Jewell	*a* 14	1886	16	34.3	16	10.6	14	7.7	14	2	8	6	40	16	25.6
	b 5	1900	5	111.4	5	24.4	3	26.7	3					5	87
Johnson	*a* 6	1883	7	19.1	5	9.8	7	8.6	5					7	10.6
	b		2	95			2	22.5	0					2	72.5
Kearny	*a* 3	1904	3	19.7	3	10	3	10	3					3	9.7
	b 1	1895	3	166.7			3	30	0					3	136.7
Kingman	*a* 9	1891	16	37.4	12	10.3	16	10.3	12	3	17			16	27.1
Kiowa	*a* 5	1892	6	41.8	5	23.4	6	19.7	5					6	22.2
	b 7	1897	8	116.4	7	17.6	8	16.6	7					8	99.7
Labette	*a* 6	1883	13	23	11	9	13	8.3	11			2	3	13	14.7
Lane	*a* 8	1899	13	43.4	11	9.1	10	8.4	8	1	6	1	3.5	13	35
	b 4	1903	4	90.7	4	16.2	4	15	4			1	5	4	75.7
Lincoln	*a* 3	1887	5	34.2	5	7.6	5	6.8	5			2	4	5	27.4
	b 1	1890	2	89.5	2	53.5	2	51	2			1	5	2	38.5
Linn	*a* 5	1892	5	32.2	5	17.6	5	18	5	1	4	1	2	5	14.2
	b 1	1870	2	123.5	1	80	2	77.5	1					2	46
Logan	*a* 1	1900	2	33.5	1	16	2	13.5	1			1	1	2	20
	b 4	1890	6	101.5	6	12.3	6	11.7	6			2	4	6	89.8
Lyon	*a* 16	1888	20	24.4	17	9.9	20	11	17	6	41	1	5	20	13.4
Marion	*a* 15	1884	19	39.1	16	9.6	19	8.6	16	1	1	2	7	19	30.5
	b 8	1889	11	73.3	9	17.4	11	21.1	9	1	2	1	2	11	52.2
Marshall	*a* 4	1896	6	30.5	4	16.7	6	10	4			2	12	6	20.5
	b 4	1882	4	96.2	4	22.5	4	18.7	4			2	15	4	77.5
McPherson	*a* 14	1887	22	33.9	19	12.6	22	11.9	19	1	13	5	23.5	22	22
	b 1	1900	1	140	1	100	1	100	1					1	40
Meade	*a* 6	1895	6	46.7	6	39.7	6	43.8	6	2	25			6	2.8
Miami	*a* 10	1885	12	24.2	9	10.4	12	9.5	9	2	4	1	1.5	12	14.6
	b 1	1899	3	261.7	1	585	3	210	1					3	51.7
Mitchell	*a* 21	1887	21	32	19	9.1	21	8.9	19	3	21	5	30	21	23.1
	b 4	1894	4	117.5	4	42.5	4	42.5	4					4	75
Montgomery	*a* 9	1886	10	24.7	9	6.1	10	5.9	9			5	5.5	10	18.8
Morris	*a* 8	1879	11	30.1	8	8.5	11	6.2	8			3	16	11	23.9
	b 6	1886	8	82.6	3	19.7	8	32.6	3	1	17			8	50
Morton	*b* 3	1900	3	110	3	18.7	3	18.7	3					3	91.3
Nemaha	*a* 11	1883	12	40.2	10	11.3	11	12.4	9	3	6			12	28.2
	b 3	1896	4	144.2	2	50	4	52.5	2					4	91.7
Neosho	*a* 11	1882	11	30	11	16.1	11	14.6	11			4	16	11	15.5
	b 1	1909	2	75	2	45	2	45	2					2	30
Ness	*a* 15	1890	17	43.2	14	7	17	6.2	14	4	8	4	20	17	37
	b		2	340			2	85	0					2	255
Norton	*a* 4	1902	6	41.7	4	14	6	11	4					6	30.7
	b 13	1899	15	109.1	11	13.3	15	11.9	11					15	97.1
Osage	*a* 8	1880	8	22.9	8	11.1	8	9.9	8	1	2	3	12	8	13
	b 3	1901	5	83.4	3	54.3	5	38.6	3	1	10			5	44.8
Osborne	*a* 10	1886	10	31.6	9	10.2	10	12.6	9	3	13	3	9	10	19
	b 2	1903	2	140	2	60	2	50	2			2	20	2	90
Ottawa	*a* 11	1879	11	43.2	11	5.7	11	5.8	11	1	1	1	0.5	11	37.4
	b 1	1902	2	155	2	55	2	55	2					2	100
Pawnee	*a* 7	1894	11	37.8	9	13.2	11	15.8	9	4	5			11	22
Phillips	*a* 7	1885	9	38	9	9	9	6.7	9			4	21	9	31.3
	b 3	1886	3	156.7	3	16.7	3	6.7	3			1	30	3	150
Pottawatomie	*a* 19	1882	19	39.3	19	9.4	19	10.9	19	10	39	2	10	19	28.4
Pratt	*a*		4	19.5			4	4	0					4	15.5
	b 7	1892	10	102.6	2	14.5	10	30.5	2			1	4	10	72.1
Rawlins	*a*		1	32	1	12	1	11	1			1	1	1	21
	b 1	1890	3	175	3	15.3	3	15.3	3					3	159.7
Reno	*a* 12	1897	12	39.4	12	19.5	12	19.1	12			3	5	12	20.3
Republic	*a* 4	1888	4	35.5	4	6.9	4	6.9	4					4	28.6
	b 3	1896	3	100.3	3	26			0					3	74.3
Rice	*a* 12	1887	15	31.5	10	22.6	15	18.8	10					15	12.7
	b 3	1897	3	96.7	3	35	3	35	3					3	61.7
Riley	*a* 10	1884	11	29.8	6	8	11	13.3	6	3	19	1	6	11	16.5
	b 3	1883	4	88.7	3	30	4	25	3			1	10	4	63.7
Rooks	*a* 8	1890	9	39	8	8.5	7	10.3	6	2	6			9	30.3
	b 3	1895	4	193.7	4	62.5	4	68.7	4	2	100	1	75	4	125
Rush	*a* 8	1886	8	23.6	8	4.1	8	6.3	8	4	19	1	1	8	17.3
	b 3	1904	3	299.3	1	200	3	163.3	1					3	136
Russell	*a* 10	1883	13	26.3	12	5.3	13	6	12	6	9.5			13	20.3
	b		2	147.5	1	45	2	42.5	1					2	105
Saline	*a* 7	1884	7	36.4	6	7.8	7	8.4	6	1	4	3	8	7	28
Scott	*b* 6	1894	6	119.8	6	17.2	6	17.2	6					6	102.7
Sedgwick	*a* 1	1879	4	33			4	10.7	0					4	22.2
	b		3	78.7			3	30	0					3	48.7
Seward	*a* 2	1900	2	42	2	9	2	9	2					2	33
	b 8	1903	8	182.6	8	15.7	8	15.7	8					8	166.9

KANSAS—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Shawnee	*a* 3	1876	3	40	3	13.3	3	10	3			1	10	3	30
Sheridan	*a* 1	1901	2	27.5	1	30	2	17.5	1					2	10
	b 2	1893	3	122.7	2	26	3	22.3	2					3	100.3
Sherman	*b* 11	1901	14	121.9	12	11.9	14	12	12					14	109.9
Smith	*a* 6	1893	6	32.3	6	8.7	6	5	6			3	22	6	27.3
Stafford	*a* 5	1890	10	32.3	2	18.5	10	10.6	2					10	21.7
	b 4	1897	4	71.2	2	62	4	39.2	2					4	32
Stanton	*a* 4	1908	4	56.5	4	9	4	9	4					4	47.5
	b 5	1902	5	237	5	135.2	5	135.2	5					5	101.8
Stevens	*b* 7	1896	8	139.7	7	18.9	8	20.2	7			1	20	8	119.5
Sumner	*a* 9	1895	12	33.4	9	7.9	10	8.4	8			1	2	12	24.7
	b		1	200			1	50	0					1	150
Thomas	*a* 1	1894	2	38	1	35	2	19.5	1					2	18.5
	b 15	1897	16	132.5	14	15.2	14	14.6	12	1	3			16	118.2
Trego	*a* 3	1902	4	35	3	17	2	9.5	1					4	21.5
	b 3	1909	4	75.5	3	17.7	3	16.7	2			1	1	4	60
Wabaunsee	*a* 5	1885	5	30.6	5	7	5	8.8	5	3	9			5	21.8
	b 2	1893	3	68.3	2	38.5	3	27	2					3	41.3
Wallace	*a* 6	1899	6	53.3	5	5.4	6	5.2	5					6	48.2
Washington	*a* 8	1880	8	36.9	8	5.7	8	7.2	8	4	13.5	1	2	8	29.7
	b 5	1888	6	125.2	6	35.5	6	25.5	6			1	60	6	99.7
Wichita	*a*		1	15			1	3	0					1	12
	b 13	1897	15	88.5	11	9.2	15	8.8	11	1	2	1	4	15	79.7
Wilson	*a* 15	1890	15	20.7	13	9.2	15	7.7	13			6	16.5	15	13
Woodson	*a* 11	1887	13	31.2	10	11.5	13	12.1	10	3	10	1	10	13	19.1
	b 3	1896	3	85	3	53.3	3	35	3			2	55	3	50
Wyandotte	*a* 7	1892	8	36.7	7	8.4	8	8.2	7					8	28.5
	b 2	1886	3	109	2	2	3	14.7	2					3	94.3
Total	*a* 758	1886.6	911	32.6	748	10.2	889	10.0	727	128	539.0	137	461.0	911	22.7
	b 323	1895.7	406	126.4	307	35.7	392	36.2	293	14	312.5	29	373.0	406	90.4
Aggregate	1,081	1889.3	1,317		1,055		1,281		1,020	142	851.5	166	834.0	1,317	43.5

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Allen	3	1	5				6	Harvey	6	2	13	2			17
Anderson	8	4	12				16	Haskell	2			1		5	6
Atchison	3	1	5	3			9	Hodgeman	2		2	2	3	1	8
Barber	7	3	13	3	3		22	Jackson	2		2	3		1	6
Barton	5	1	8	4	2	2	17	Jefferson	3	2	3	2	1		8
Bourbon	2	1	5				6	Jewell	7		11	6	3	1	21
Brown	10	2	14	15	3		34	Johnson	4	4	3		2		9
Butler	7	2	12	10	1		25	Kearney	2	1	2		1	2	6
Chase	6	1	15	1	2		19	Kingman	5	3	6	6	1		16
Chautauqua	3	4	5	1			10	Kiowa	5	1	4	1	6	2	14
Cherokee	6	2	13	1			16	Labette	6	4	8	1			13
Cheyenne	2					6	6	Lane	6		9	1	7		17
Clark	4		4	1	2	1	8	Lincoln	2		5	2			7
Clay	11		11	13	7	3	34	Linn	2	2	4		1		7
Cloud	5	2	4	6	2	1	15	Logan	2		2		5	1	8
Coffey	7	2	17	1			20	Lyon	10	3	17				20
Comanche	1		3	1			4	Marion	10	1	12	12	5		30
Cowley	6	1	12	6		1	20	Marshall	5		5	2	2	1	10
Crawford	2	3	1				4	McPherson	8	2	18	3			23
Decatur	4		6	2		3	11	Meade	2	5	1				6
Dickinson	6		6	7	5	1	19	Miami	5	2	11	1	1		15
Doniphan	3		10	3	1		14	Mitchell	10	2	13	7	3		25
Douglas	4	2	10				12	Montgomery	5		9	1			10
Edwards	5	2	8	3			13	Morris	5		10	7	2		19
Elk	2	2	5	2		1	10	Morton	1				3		3
Ellis	4	5	7			5	17	Nemaha	6		7	6	1	2	16
Ellsworth	8	1	15	4	2	2	24	Neosho	4	3	9	1			13
Finney	5	4	3	3	1	2	13	Ness	7	1	3	13		2	19
Ford	2		4	2			6	Norton	7		2	6	7	6	21
Franklin	5	3	5	1	2	1	12	Osage	4	4	5	3	1		13
Geary	3		1	4	4		9	Osborne	4	2	7	1	2		12
Gove	6		7	4	4	1	16	Ottawa	4		5	5	2	1	13
Graham	3		2	5	2	2	11	Pawnee	5	3	4	4			11
Grant	1					3	3	Phillips	5		4	5	2	1	12
Gray	3			2	2	4	8	Pottawattomie	7	1	12	4	2		19
Greenwood	4	2	9	1			12	Pratt	6	1	3	6	2	2	14
Hamilton	3	3	1	1	1	6	12	Rawlins	2		1			3	4
Harper	2		5	3			8								

KANSAS—Continued.

PROPORTIONATE DEPTHS—Continued.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Reno	6	1	9	2	.....	....	12	Stanton	3	1	.....	4	.....	4	9
Republic	3	.....	2	3	2	....	7	Stevens	3	.....	.....	.....	.....	8	8
Rice	6	6	9	1	2	....	18	Sumner	4	.....	9	3	.....	1	13
Riley	5	3	6	4	2	....	15	Thomas	6	.....	2	.....	3	13	18
Rooks	5	.....	5	4	2	2	13	Trego	3	1	2	4	1	....	8
Rush	4	2	6	.....	1	2	11	Wabaunsee	3	.....	5	2	1	....	8
Russell	5	2	10	1	1	1	15	Wallace	2	1	1	1	3	....	6
Saline	2	.....	3	4	.....	....	7	Washington	5	2	1	6	3	2	14
Scott	2	.....	.....	.....	3	3	6	Wichita	5	.....	1	2	13	....	16
Sedgwick	3	1	3	3	.....	....	7	Wilson	6	8	6	1	.....	....	15
Seward	3	.....	1	1	8	....	10	Woodson	6	1	11	3	1	....	16
Shawnee	1	.....	2	1	.....	....	3	Wyandotte	4	1	4	3	2	1	11
Sheridan	1	.....	2	.....	1	2	5								
Sherman	5	.....	.....	2	5	7	14	103 counties	456	135	605	290	165	122	1,317
Smith	2	.....	3	3	.....	....	6	Per cent	.....	10.3	45.9	22.0	12.5	9.3	.....
Stafford	4	2	7	5	.....	....	14								

Reporters' remarks:

Allen County: "Springs broke out in the dry year 1901, where there were never springs before, and are still flowing." "The drilled wells generally strike sheet water in good quantities." Anderson County: "All wells have a greater depth of water than when dug." "Wells are more easy to get than they were years ago." Atchison County: "Sheet water; depth varies according to the ground." Barber County: "Water has not varied in depth in years." "Water level scarcely varies at all." "What is called sheet water; never gets any lower or higher." Barton County: "The water is supplied by underflow from Arkansas River and is inexhaustible." Brown County: "Wells in sheet water; the underflow is so strong that it can not be pumped dry." "A spring started this year." Butler County: "No perceptible change in water level for 36 years." "No change in the water supply for the last 29 years." "The water is deeper in the wells now than it was in first settling of this country [1872], and there are more springs and they are stronger." Chase County: "Wells are sheet water and do not vary much by drought or otherwise." "The ground water (or undercurrent, as we call it) is about 10 or 15 feet below stream beds." Chautauqua County: "A spring of recent date; two wells have failed." "Wells 15 years ago considered good, now dry." Cherokee County: "Have lived on this quarter section since 1869; wells are sheet water; never go dry; supply more water than they did 25 years ago." Cheyenne County: "When we strike water it stands the same." Clark County: "We have sheet water, and the wells do not seem to lower or exhaust the water." "No wells in which the depth of water has changed." "Sheet water; wind engine can make no diminution in 24 hours." "This part of Kansas is underlain with sheet water on the level of Arkansas and Cimarron Rivers; the depth of wells varies from the divides to the river bottoms." Clay County: "In 1894 many wells had to be sunk deeper and some springs got dry; but the water came back." "Sheet water covers a large part of this country and makes little change in dry or wet weather; there are more springs and more water than when country was first settled on account of the cultivation keeping the rainfall." "Have lived here 40 years and get water about the same depth." Cloud County: "Water in all wells stands at the same level as when dug." Comanche County: "The depth of water in wells never changes." Cowley County: "All sheet water in gravel." "The wells have more water than formerly; some wells have springs coursing through them." Crawford County: "No material change in the amount of water furnished by wells in the last 25 years." Decatur County: "All sheet water from 24 feet on the low land to 200 feet on the highest; never-failing wells." Dickinson County: "Water supply about the same now that it was 40 years ago." "Wells do not change; long dry spells do not affect them." "In 1880 could get plenty of water at 24 feet; now have to go from 32 to 36 feet." Douglas

County: "The depth of water has increased one-half since breaking up the land, as it trickles more slowly through the soil." Edwards County: "Underflow supplies water, and its level does not change." "Wells on a level with the sheet water, therefore they do not recede." "Sheet water and lots of it." "All our well water is sheet water and the supply is inexhaustible; never any wells go dry; the depth of water in the wells is about always the same." Ellsworth County: "Several springs have come to the surface and are supplying water for stock, that were not known a few years ago." "There are springs along the creek that were not there 7 years ago." "A spring has been gradually failing for 10 years; one well failed entirely in 1890." "A well was robbed by a cottonwood grove." Finney County: "This country is supplied with sheet water; no change in conditions, whether wet or dry, affects the water supply." "Strike sheet water at 8 to 10 feet; pumping 1,100 gallons per minute only lowers water 5 feet, which comes back soon as pump stops." "All wells are sheet water." Ford County: "Wells not affected by dry weather or wet; no end to current of water." "Within 3 or 4 years a spring broke out on the bank of Coon Creek, causing the creek to have a continuous flow; previously no water flowed except during wet spells." Franklin County: "Wells mostly seem stronger; have had 5 good springs break out in the last 20 years." Geary County: "There is more water in wells and the springs are stronger and more of them than 40 years ago." Gove County: "The water in this country is all sheet water." "All water is what is called sheet water and can be got according to elevation and location of the well; no difference in the height the water rises in the well." "Dry weather does not affect the well supply; can not pump them dry." Graham County: "Water remains about the same." "No wells abandoned for lack of water." Gray County: "No variation in water supply in wells." "Drilled wells go to sheet water; no change in water level; in dug wells supply not so good." "We have an immense underflow of water." Hamilton County: "There is an underflow that can not be pumped dry." Harvey County: "Wells are supplied from sheet water in sand and are not changed by wet or dry weather." "The irrigation in the west appears to increase our underflow." Haskell County: "The water in this country is supposed to be sheet water; an unlimited supply." Hodgeman County: "Well is in sheet water supplying water for stock and irrigation of garden; springs always run the same." Jefferson County: "It is a rare thing that a well fails." Jewell County: "The water here is sheet water." "The water level has increased some since breaking up the land." "There are groves all around the wells," presumably robbing them. Johnson County: "The quantity in wells is about the same for the last 30 years." Kearny County: "Wells all dug to sheet water which flows through sand and gravel; is only slightly affected by long-continued droughts when heavy irrigating is done westward from the wells; water level sometimes rises 2 feet above normal, gradually sinking back in two weeks." Kingman County: "We have regular sheet water; water good and never exhaustible." "This is what is called sheet water; it is not in streams or veins but everywhere; there is no variation, always plenty." Kiowa County: "Wells are never failing, being sheet water." "Wells put down into sheet water and can not be pumped dry; drought or wet seasons make no difference in amount of water in wells; knew hundreds of wells during 26 years in this country, and no failure of supply." "All sheet water apparently on level, so depth depends on lay of the land." "No change in the water level in the last 20 years." Labette County: "Water as plentiful and got at the same depths as 40 years ago." Lane County: "Depth varies as to high or low ground; no difference as to water level in the past 24 years." "A good strong spring failed entirely about 10 years ago." "There are two kinds of wells; one kind go to sheet water at 10 to 100 feet, according to location and never go dry and water never rises from surface causes; the other kind get water in 'pockets,' and go dry whenever enough water is used to exhaust the supply." Lincoln County: "No difference in water now and 30 years ago, except one or two springs went dry 25 years ago." "If any difference, the underflow has increased; wells are not affected by dry or wet weather." Logan County: "The water is sheet water;

anywhere a well is put down the supply is inexhaustible; the depth depends on the elevation of the land." Lyon County: "Notice no difference in best wells since 1857." "Water level about the same for 26 years, except there are more springs." "A well will water 1,000 head of cattle, and windmill may pump all the time and not exhaust the supply." Marion County: "In 26 years note no changes." "A great many springs have started in the last 5 or 6 years." "In 36 years the springs remain about as they were; well water level remains the same." McPherson County: "Nearly every well has more water than when first dug." Mitchell County: "A few years ago the water seemed to sink in wells from 2 to 10 feet, but has come back where it was." "Wells are 145 feet deep, with 45 feet of sheet water." "All wells have been sunk from 4 to 7 feet deeper; go to sheet water." "No changes worthy of notice in wells in 25 or 30 years." Morris County: "Water is stronger in most wells than when first made." Nemaha County: "More springs now than years ago." "Water level a few years ago seemed to settle, and many wells failed." "Drill to underflow from mountains; unlimited supply." Ness County: "The level of water is 4 to 6 feet lower; a large spring with a large acreage of alfalfa around it is almost dry; other springs getting weaker." "In 33 years the county has been subjected to extreme drought, yet most wells are on the gain." "Wells never fail unless trees, especially cottonwoods, are planted near them." "The water strata seem to be uniform, and upland wells are as much deeper as they are elevated above the bottom." Morton County: "Water is obtained from what the people call 'sheet water,' which seems to have a general level below the surface and is not affected by weather conditions." "In 31 years never knew of a well changing its water level." "Have sheet water; never known to fail." "Difference in depth due to elevation; water in the wells has not changed in 25 years." "Wells all go to sheet water." Ottawa County: "Water changed very little if any in 44½ years." "Well is in the sheet water; when the city waterworks had been in operation a short time most of the wells had to be dug deeper." Pawnee County: "Have sheet water fed by Arkansas River; wet or dry weather never affects the water." Phillips County: "As the prairie is broken many springs are covered by washing of soil into creek beds." "The country has an underflow of sheet water, and water can be secured anywhere; numerous springs that never go dry." "A good many springs have dried up; wells seem to hold their own." "Water lowering since 1872; 6 to 10 feet lower in wells in 1910; creeks much lower, and the greater part of the springs dry; going lower every year." Pottawattomie County: "Wells about the same for the last 25 years." "In 35 years do not know of any wells drying up; water supply better than for many years since; many springs have been discovered." "This section supplied with sheet water which never lowers or rises." Pratt County: "The water is obtained from a sheet of water underlying the whole country at a depth varying with the undulating surface; inexhaustible supply." "Sheet water found at about the same level in sand; can not pump well dry with engine." "Water is sheet water and is not affected by rain; we have an abundance." Reno County: "The level of the water has always been the same." "Depth of water in wells has not varied." "We have sheet water; can place a well anywhere and strike the same; there is no pumping machine that can lower it." "Wells are now averaging some deeper; the supply is sheet water and the level seems to be lowering somewhat." "Can not notice any change in water supply in 38 years." Republic County: "Water has not changed where the wells are down to sheet water." Rice County: "Water supply is a general sheet of pure water and unlimited." "The underflow is very strong; wells never go dry." "Wells are down to what is called the underflow from the mountains; will stand the ordinary windmill pumping all the time." Riley County: "A spring unknown 20 years ago comes out of a crevice in rock; first noticed as a trickle soon drying up, it has gradually increased to a year-round stream, sufficient for 100 head of cattle." Rooks County: "Can see no change in 37 years." Rush County: "Wells in a draw, formerly in buffalo grass, burned off every year; now much of the land is plowed, the balance never burned, but bearing a heavy crop of grass 1 to 5 feet high

each year, which holds much of the rain from running off the land and lets it go in the ground; at first could water only 60 head of cattle at one well, but now a windmill can pump all the time without exhausting the supply." Russell County: "For several years the water has been deeper than in earlier years, attributable to cultivation of land, so that less water flows off." "The more land broken up, the more water kept back for wells; most wells are better than when dug." Sedgwick County: "Never heard of a well going dry in 33 years." Seward County: "Wells furnish an unlimited supply; water is in gravel; never heard of a well going dry." Sheridan County: "Wells never fail; can't pump them dry." Sherman County: "Wells all in sheet water; endless supply for miles around." "Water has not changed in wells for 24 years." Smith County: "The water has been going lower in wells and springs are drying up." Stafford County: "The water is sheet water; there has never a well given out." "All wells to sheet water; supply inexhaustible; level always the same." Stanton County: "Water seems to be sheet water, about the same level all over the country." Stevens County: "Water never varies except with [Cimarron] river; we have what is called an underflow all over this country." "When a well is drilled down to sheet water or underflow no pump can lower the flow." "We get sheet water and it is inexhaustible." Sumner County: "Can get water anywhere; considered sheet water." "The water is about the same depth all over and stays the same in wet or dry weather." Thomas County: "Water found anywhere at what is supposed to be a common level." "For 20 years water has not varied much; it is sheet water and apparently the same depth." "Wells do not seem to be affected, but the streams have dried up considerably in the past 4 or 5 years." "Never heard of a well failing if they go about 10 feet in the sheet water; windmills never pump them dry." Trego County: "Never heard of a well failing." Washington County: "No appreciable change in the depth of water since 1870." "Water in deep wells is the same as years ago, but the water in shallow wells and springs is getting more plentiful every year." Wichita County: "All sheet water here, and no end to it; can not pump it dry." "No change in the water of wells since 1887." Wilson County: "Do not see any difference in water now and 35 or 40 years ago." "No difference in the water in wells since 1871." Wyandotte County: "The permanent water is on an even level and the depth of each well depends only on the elevation of the land surface." "No alteration in the water level." "The average ground water depth has not changed in the past 25 years."

The foregoing remarks (like many others not quoted) clearly indicate recognition of conditions affecting the ground level of water in all portions of the State. They show that in some localities the water level has lowered, that in others it has risen, that here and there it has oscillated, but that in general its level is notably stable—regulated by underflow from the higher country farther westward and by the level of the rivers transecting the State. Here, as elsewhere, the remarks are strikingly consistent with the records: Of the dug wells, only 36.5 per cent reveal change, somewhat the larger number indicating rise, but in less measure than lowering, giving a mean rise for the 727 dug wells of the State of 0.042 foot per decade; of the drilled wells only 14.7 per cent show change so balanced as to give a mean lowering for the 293 bi-state wells of 0.144 foot per decade, a mean change for the two classes of wells almost precisely balancing in such manner as to indicate maintenance of the average depth of the ground level of water throughout the State since settlement and well making began.

KENTUCKY.

BLUEGRASS.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Adair	*a*	5	1906	7	31.9	6	11.5	7	10.1	6	....	.....	....	.....	7	21.7
	b	1	1909	2	86.5	1	12	2	12	1	....	.....	....	.....	2	74.5
Allen	*a*	12	1894	14	41.7	14	7.1	14	5.7	14	....	.....	9	20	14	36
	b	3	1903	3	70.7	3	14	3	12.3	3	....	.....	2	5	3	58.3
Anderson	*a*	3	1880	5	30.4	3	7.7	5	4	3	....	.....	3	10	5	26.4
	b		.....	1	75	....	.....	1	12	0	....	.....	....	.....	1	63
Barren	*a*	3	1901	5	36.2	5	8.2	5	7.4	5	....	.....	1	4	5	28.8
	b	3	1903	3	117.3	3	20	3	20	3	....	.....	....	.....	3	97.3
Bath	*a*	1	1818	11	25.5	4	12.7	11	6.7	4	....	.....	4	19	11	18.8
	b	2	1900	2	100	1	75	2	72.5	1	....	.....	....	.....	2	27.5
Boone	*a*	2	1860	4	23.7	2	6	4	3.2	2	....	.....	2	5	4	20.5
Bourbon	*a*	2	1850	2	25	2	7	1	10	1	....	.....	....	.....	2	18
Boyd	*a*	5	1870	6	23.3	6	9	6	7.8	6	1	2	3	9	6	15.5
	b	1	1910	1	130	1	80	....	.....	0	....	.....	....	.....	1	50
Boyle	*a*	6	1884	7	29.4	6	16	7	9.9	6	1	3	5	33	7	19.6
	b	2	1900	3	133.3	2	30	3	45	2	1	10	1	35	3	88.3
Bracken	*a*	2	1882	3	38.3	2	4.5	3	6	2	....	.....	1	1	3	32.3
	b	1	1900	1	70	1	15	1	15	1	....	.....	....	.....	1	55
Breckinridge	*a*	9	1891	10	37.1	10	10.8	10	8.7	10	1	2	5	23	10	28.4
Butler	*a*	10	1893	12	35.7	10	9.9	12	7.1	10	....	.....	7	25	12	28.7
	b		.....	1	129	....	.....	1	101	0	....	.....	....	.....	1	28
Caldwell	*a*	12	1877	12	35.2	12	7.8	12	7.1	12	1	2	5	10.5	12	28.1
Campbell	*a*		.....	1	15	1	5	1	0	1	....	.....	1	5	1	15
Carroll	*a*	2	1907	6	45.2	5	7.6	6	5.8	5	....	.....	3	13	6	39.3
	b	1	1909	1	98	1	6	1	6	1	....	.....	....	.....	1	92
Carter	*a*	6	1880	11	28	8	16	11	8.1	8	....	.....	8	51	11	19.9
Casey	*a*	9	1894	13	28	9	11.8	13	11.8	9	2	2.5	5	10	13	18.7
Christian	*a*		.....	3	24	3	7.3	1	6	1	....	.....	1	4	3	18
	b	1	1895	1	70	1	30	1	30	1	....	.....	....	.....	1	40
Clark	*a*	2	1872	2	26	....	.....	2	3.5	0	....	.....	....	.....	2	22.5
	b	1	1878	1	80	....	.....	1	15	0	....	.....	....	.....	1	65
Clinton	*a*	9	1887	11	41.2	9	10.3	11	6.9	9	....	.....	6	31	11	34.3
Crittenden	*a*	10	1882	11	34.5	7	17	11	9.8	7	....	.....	5	48	11	24.7
	b	1	1899	3	88.7	2	28	3	22	2	....	.....	....	.....	3	66.7
Cumberland	*a*	2	1891	2	28.5	2	15	2	15	2	....	.....	....	.....	2	13.5
	b	1	1904	1	107	1	15	1	0	1	....	.....	1	15	1	107
Daviess	*a*	3	1875	3	18.7	3	10.3	3	7.7	3	....	.....	2	8	3	11
Edmonson	*a*	6	1890	10	29.3	7	12.9	10	5.7	7	....	.....	5	48.5	10	23.6
Elliott	*a*	1	1893	4	22.7	4	6.7	4	4.5	4	....	.....	3	9	4	18.2
Estill	*a*	6	1884	6	27.8	4	11.2	6	6.2	4	....	.....	3	18	6	21.7
Fayette	*a*	3	1854	3	21.7	1	20	3	6.3	1	....	.....	1	10	3	15.3
	b	2	1903	2	167.5	2	57.5	2	57.5	2	....	.....	....	.....	2	110
Fleming	*a*	4	1873	7	21.4	6	12	7	9.3	6	....	.....	3	12	7	12.1
Franklin	*a*	3	1897	5	35.4	4	8.7	5	9.2	4	....	.....	1	4	5	26.2
	b		.....	1	65	....	.....	1	20	0	....	.....	....	.....	1	45
Garrard	*a*	5	1876	8	30.2	8	8	6	8.2	6	....	.....	1	3	8	22.6
	b	1	1900	1	80	1	6	1	6	1	....	.....	....	.....	1	74
Grayson	*a*	5	1904	5	34.2	5	13.6	3	14.6	3	....	.....	....	.....	5	20.6
	b	1	1909	1	92	1	30	....	.....	0	....	.....	....	.....	1	62
Green	*a*	12	1893	14	33.7	11	11.4	14	10.1	11	1	2	4	18	14	23.6
	b	2	1908	2	70	2	17	2	13	2	....	.....	2	8	2	57
Greenup	*a*	9	1880	11	25.7	10	13	11	10.4	10	....	.....	9	18	11	15.3
Hancock	*a*	6	1871	9	40.3	7	13.4	9	11.7	7	3	6	4	13	9	28.7
Hardin	*a*	1	1880	3	25	....	.....	3	13.7	0	....	.....	....	.....	3	11.3
	b		.....	2	85	....	.....	2	17.5	0	....	.....	....	.....	2	67.5
Harrison	*a*	7	1881	7	22.1	6	3.2	7	4.6	6	....	.....	2	1.5	7	17.5
	b	1	1908	1	150	1	86	1	86	1	....	.....	....	.....	1	64
Hart	*a*	8	1876	9	23.6	8	4.9	9	4.7	8	....	.....	....	.....	9	18.9
	b	4	1907	5	115	1	13	5	21.2	1	....	.....	....	.....	5	93.8
Henderson	*a*	3	1879	5	39	4	9.2	5	7	4	....	.....	3	7	5	32
Henry	*a*	6	1890	10	22.8	8	9.1	10	6.2	8	....	.....	8	29	10	16.6
Hopkins	*a*	1	1885	3	28.2	3	12	3	5.3	3	....	.....	2	20	3	22.8
	b		.....	4	105	2	37.5	4	37.5	2	....	.....	1	5	4	67.5
Jackson	*a*	6	1896	6	34.2	5	12.6	6	12.5	5	3	7	2	10	6	21.7
Jefferson	*a*	3	1880	6	36.7	4	5.5	6	5.7	4	....	.....	1	3	6	31
	b	2	1895	5	77.6	3	9.2	5	19.9	3	....	.....	....	.....	5	57.7
Jessamine	*a*	3	1869	3	19.3	3	4.3	3	3.5	3	....	.....	2	2.5	3	15.3
Kenton	*a*	2	1888	3	32.2	2	11.5	3	3.3	2	....	.....	2	15	3	28.8
	b	1	1908	1	100	1	20	1	20	1	....	.....	....	.....	1	80
Larue	*a*	1	1840	2	47.5	1	16	2	14	1	....	.....	1	2	2	33.5
	b	1	1894	3	85.3	1	40	3	26.3	1	....	.....	....	.....	3	59
Laurel	*a*	9	1884	10	32.1	6	12.7	10	10.9	6	1	2	4	9	10	21.2
	b	3	1907	4	85	3	76.7	3	53.3	2	1	5	1	25	4	25
Lee	*a*	6	1893	8	21.7	3	9.3	8	12.4	3	....	.....	2	2	8	9.4
	b	1	1894	1	83	1	23	1	5	1	....	.....	1	18	1	78
Lewis	*a*	11	1882	14	24.2	13	13.2	13	10.7	12	3	5	9	41	14	14
	b		.....	1	142	1	52	1	52	1	....	.....	....	.....	1	90
Lincoln	*a*	9	1887	10	20.1	10	8.3	10	6.5	10	1	0.5	2	13	10	13.5
	b	1	1885	1	70	1	35	1	40	1	1	5	....	.....	1	30

KENTUCKY—Continued.

BLUEGRASS.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Livingston	*a* 9	1886	9	32.8	9	14.2	9	13.9	9	1	3	2	6	9	18.9
	b 1	1908	1	83	1	12	1	12	1					1	71
Logan	*a* 2	1883	6	193			6	9.8	0					6	22.3
	b 4	1885	5	90.8	3	36.7	5	34	3			1	10	5	56.8
Lyon	*a* 10	1888	10	33.6	7	17.7	10	6.7	7			7	70	10	26.9
	b 3	1890	3	116.7	3	28.3	3	41.7	3	3	40			3	75
Marion	*a* 7	1886	8	28	8	13.9	8	12.7	8	2	3	3	12	8	15.2
McLean	*a* 6	1868	8	25.6	6	13.7	8	10.7	6	2	2.5	1	8	8	14.9
Meade	*a*		3	38.3			3	6	0					3	32.3
	b		2	115			2	35	0					2	80
Menifee	*a*		2	17.5			2	5	0					2	12.5
Mercer	*a* 3	1905	6	42.7	6	10.7	6	9.2	6			2	9	6	33.5
Metcalfe	*a* 7	1899	7	43.4	7	6.3	7	5.6	7			2	5	7	37.9
	b 4	1888	5	111.2	5	74.6	5	73.8	5			1	4	5	37.4
Monroe	*a* 2	1904	5	38.4	4	7.5	3	5.3	2			2	12	5	33.6
	b 2	1900	3	80.7	2	19	2	25	1			1	10	3	61.3
Muhlenberg	*a* 6	1874	9	29.1	9	7.2	9	5.2	9			5	18	9	23.9
	b 2	1907	2	90	2	21	2	21	2					2	69
Nelson	*a*		5	34	5	7.8	5	7.4	5			1	2	5	26.6
Nicholas	*a* 6	1904	8	24.7	5	5	8	5.2	5			2	3	8	19.5
Ohio	*a* 5	1871	6	29.3	5	13.2	6	11	5			1	5	6	18.3
	b 4	1902	4	104	4	30	4	27.5	4			1	10	4	76.5
Oldham	*a* 3	1867	3	25	1	15	3	10	1			1	5	3	15
Owen	*a* 2	1879	2	35	2	7.5	2	5.5	2			2	4	2	29.5
Pendleton	*a* 4	1881	6	23.5	4	4	6	3.4	4			2	3.5	6	20.1
Pulaski	*a* 15	1894	15	30.5	15	6.1	15	5.7	15	3	4	6	11	15	24.8
Rockcastle	*a* 3	1902	5	22	5	10.4	5	8.2	5			2	10	5	13.6
	b 2	1898	2	77.5	2	13.5	2	11	2			2	5	2	66.5
Rowan	*a*		1	40	1	8	1	7	1			1	1	1	33
Russell	*a* 3	1907	7	26.3	3	7.3	7	5.3	3			1	2	7	21
Scott	*a* 5	1886	5	35	5	13	5	12	5	1	5	2	10	5	23
	b		1	150	1	82	1	82	1					1	68
Shelby	*a*		1	25	1	5	1	5	1					1	20
	b 2	1905	2	97.5	2	28	2	25	2			2	6	2	72.5
Simpson	*a* 3	1865	3	35	3	15	3	6	3			3	27	3	29
Spencer	*a*		3	26.7	3	7.7			0					3	19
Taylor	*a* 1	1890	5	26	5	5.2	1	10	1					5	20.8
Todd	*a* 8	1892	8	40.3	7	10.3	8	9.2	7	1	5	4	18.5	8	31.1
	b 2	1901	2	136.5	2	25	2	25	2					2	111.5
Trigg	*a* 2	1865	5	26.1	3	4.8	5	6.5	3					5	19.6
Union	*a* 2	1884	6	37.7	6	17.3	3	20.7	3			2	7	6	21.5
Warren	*a* 4	1886	4	38.7	1	35	4	10.7	1			1	15	4	28
	b 8	1903	8	140.4	5	30	8	35	5			2	20	8	105.4
Washington	*a* 2	1877	2	27	1	10	1	2.5	0					2	20.7
Wayne	*a* 13	1892	14	38.4	11	13.8	14	12.3	11	4	5	3	15	14	26.1
	b 2	1902	3	85	2	20	3	20.3	2			1	9	3	64.7
Webster	*a* 4	1881	6	31.5	5	11.9	4	7.6	3			1	7	6	22.2
	b 1	1905	2	82.5	1	30	1	25	0					2	55
Wolfe	*a* 3	1863	3	26.7	3	13.3	3	12.3	3			1	3	3	14.3
	b 2	1896	2	82.5	2	18.5	2	13.5	2			1	10	2	69
Woodford	*b* 3	1891	3	61.7	3	34.7	3	37.7	3	2	10	1	1	3	24
Total	*a* 391	1885.5	538	31.0	428	10.4	515	8.2	405	32	61.5	210	927.0	538	22.8
	b 80	1899.9	109	100.4	78	33.2	104	31.6	73	8	70.0	22	196.0	109	68.1

EASTERN.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Bell	*a* 1	1909	3	40	1	6	3	6.7	1					3	33.3
Breathitt	*a*		1	36	1	9	1	6	1			1	3	1	30
Clay	*a* 9	1872	14	29.4	7	12.7	14	9.8	7	1	5	3	15	14	19.6
Floyd	*a* 2	1905	3	32.3	3	11.7	3	9.7	3	1	2	2	8	3	22.7
Harlan	*a* 4	1897	4	23.1	3	11.3	4	8.7	3			1	2	4	14.4
Johnson	*a* 7	1875	7	25.1	7	9.4	7	8.7	7	3	3	4	8	7	16.4
Knott	*a*		6	17.3	2	12	6	6.5	2			2	8	6	10.8
Knox	*a* 3	1878	3	32	3	14	3	10	3			2	12	3	22
Lawrence	*a*		5	22.6			5	5	0					5	17.6
Leslie	*a* 12	1893	12	21.2	12	8.3	12	7.5	12	2	3	7	13	12	13.7
Letcher	*a* 5	1882	8	32.6	8	12.5	8	11	8	2	3	4	15	8	21.6
Magoffin	*a* 6	1880	9	16.7	9	6.1	9	6	9	3	5	4	5.5	9	10.8
Martin	*a* 3	1878	4	31.2	3	16.3	4	11	3			3	10	4	20.2
Owsley	*a* 4	1889	8	35	8	14.5	6	16.3	6	2	15	2	21	8	21.2
Perry	*a* 3	1907	6	27.8	4	14.7	5	8.2	3			2	24	6	20.7
	b		1	100	1	50	1	29	1			1	21	1	71
Pike	*a* 11	1885	13	19.7	13	6.8	13	5.2	13			6	20.5	13	14.5
Whittley	*a* 7	1903	11	31.2	9	11.3	8	10.9	6			3	7	11	21.5
Total	*a* 77	1884.3	117	26.4	93	10.5	111	8.6	87	14	36.0	46	172.0	117	17.9
	b 0	0.0	1	100.0	1	50.0	1	29.0	1	0	0.0	1	21.0	1	71.0

KENTUCKY—Continued.

JACKSON PURCHASE.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Ballard	*a*	.....	1	44	1	4	1	4	1	....	.....	....	.....	1	40
Calloway	*a* 6	1882	6	29.2	6	3.6	6	2.4	6	....	.....	3	7	6	26.7
Carlisle	*a*	.....	2	45	....	.....	2	5.5	0	....	.....	....	.....	2	39.5
	b 1	1910	1	140	1	50	....	.....	0	....	.....	....	.....	1	90
Fulton	*a* 2	1865	2	40	2	12.5	2	10	2	....	.....	1	5	2	30
	b	.....	1	90	1	20	1	20	1	....	.....	....	.....	1	70
Graves	*a*	.....	2	47.5	....	.....	2	5.5	0	....	.....	....	.....	2	42
	b 3	1907	3	170.7	3	24.7	3	22.7	3	....	.....	2	6	3	148
Hickman	*a* 3	1867	3	28.3	3	11.3	2	14.5	2	....	.....	....	.....	3	17
	b 3	1889	3	100.3	3	32.3	3	32.3	3	....	.....	....	.....	3	68
McCracken	*a* 9	1880	10	36.2	10	6.7	8	6	8	....	.....	2	3.5	10	29.8
	b 1	1904	2	110	1	80	1	10	0	....	.....	....	.....	2	65
Marshall	*a* 3	1858	4	40.5	3	2	4	2.2	3	....	.....	....	.....	4	38.2
Total	*a* 23	1874.8	30	36.4	25	6.3	27	5.4	22	0	0.0	6	15.5	30	30.8
	b 8	1900.2	10	126.3	9	35.7	8	24.4	7	0	0.0	2	6.0	10	93.8
State total	*a*491	1885.2	685	30.4	546	10.2	653	8.2	514	46	97.5	262	1,114.5	685	22.3
	b 88	1899.9	120	102.6	88	33.7	113	31.1	81	8	70.0	25	223.0	120	70.2
Aggregate	579	1887.4	805	.....	634	.....	766	.....	595	54	167.5	287	1,337.5	805	29.4

PROPORTIONATE DEPTHS—BLUEGRASS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Adair	3	1	5	1	2	....	9	Larue	2	.....	1	3	1	....	5
Allen	6	.....	4	11	2	....	17	Laurel	5	1	9	4	.....	....	14
Anderson	2	.....	4	1	1	....	6	Lee	3	6	1	1	1	....	9
Barren	3	.....	3	2	2	1	8	Lewis	5	4	10	.....	1	....	15
Bath	4	2	9	2	.....	....	13	Lincoln	5	4	6	1	.....	....	11
Boone	1	1	2	1	.....	....	4	Livingston	4	1	8	.....	1	....	10
Bourbon	2	.....	2	.....	.....	....	2	Logan	4	1	3	4	3	....	11
Boyd	3	1	4	2	.....	....	7	Lyon	5	.....	7	5	.....	1	13
Boyle	4	2	3	2	3	....	10	Marion	4	3	4	1	.....	....	8
Bracken	2	.....	2	2	.....	....	4	McLeon	3	.....	8	.....	.....	....	8
Breckenridge	4	2	4	3	1	....	10	Meade	2	.....	2	1	2	....	5
Butler	5	1	6	6	.....	....	13	Menifee	2	.....	2	.....	.....	....	2
Caldwell	4	2	6	4	.....	....	12	Mercer	2	.....	3	3	.....	....	6
Campbell	1	.....	1	.....	.....	....	1	Metcalfe	4	2	2	6	2	....	12
Carroll	4	.....	2	4	1	....	7	Monroe	3	.....	2	5	1	....	8
Carter	5	.....	10	1	.....	....	11	Muhlenberg	3	.....	8	2	1	....	11
Casey	4	.....	12	1	.....	....	13	Nelson	2	.....	4	1	.....	....	5
Christian	2	1	2	1	.....	....	4	Nicholas	3	2	5	1	.....	....	8
Clark	1	.....	2	.....	1	....	3	Ohio	4	.....	6	1	3	....	10
Clinton	4	.....	4	7	.....	....	11	Oldham	1	.....	3	.....	.....	....	3
Crittenden	5	1	8	3	2	....	14	Owen	1	.....	1	1	.....	....	2
Cumberland	1	1	1	.....	.....	1	3	Pendleton	3	2	2	2	.....	....	6
Daviess	1	1	2	.....	.....	....	3	Pulaski	5	2	9	4	.....	....	15
Edmonson	4	.....	8	2	.....	....	10	Rockcastle	3	2	3	1	1	....	7
Elliott	2	.....	4	.....	.....	....	4	Rowan	1	.....	.....	1	.....	....	1
Estill	2	.....	5	1	.....	....	6	Russell	3	.....	6	1	.....	....	7
Fayette	1	2	.....	1	1	1	5	Scott	2	1	2	2	1	....	6
Fleming	3	1	6	.....	.....	....	7	Shelby	2	.....	1	1	1	....	3
Franklin	2	.....	3	3	.....	....	6	Simpson	1	.....	3	.....	.....	....	3
Garrard	4	.....	8	.....	1	....	9	Spencer	1	1	2	.....	.....	....	3
Grayson	2	.....	5	.....	1	....	6	Taylor	3	.....	5	.....	.....	....	5
Green	5	1	10	5	.....	....	16	Todd	4	.....	4	4	.....	2	10
Greenup	4	3	8	.....	.....	....	11	Trigg	2	.....	4	1	.....	....	5
Hancock	3	.....	5	4	.....	....	9	Union	2	.....	5	1	.....	....	6
Hardin	3	.....	3	1	1	....	5	Warren	4	.....	3	3	3	3	12
Harrison	3	1	5	1	1	....	8	Washington	1	.....	2	.....	.....	....	2
Hart	5	3	4	3	3	1	14	Wayne	6	.....	12	4	1	....	17
Henderson	2	.....	4	1	.....	....	5	Webster	3	1	3	4	.....	....	8
Henry	4	.....	10	.....	.....	....	10	Wolfe	2	1	2	1	1	....	5
Hopkins	3	.....	2	3	2	....	7	Woodford	1	.....	3	.....	.....	....	3
Jackson	2	1	3	2	.....	....	6								
Jefferson	5	.....	5	4	2	....	11	84 counties	249	62	367	156	52	10	647
Jessamine	1	.....	3	.....	.....	....	3								
Kenton	2	.....	2	1	1	....	4	Per cent	.....	9.6	56.7	24.1	8.0	1.6	....

KENTUCKY—Continued.

PROPORTIONATE DEPTHS—EASTERN.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Bell	2	1	.....	2	.....	....	3	Magoffin	3	1	8	.....	.....	....	9
Breathitt	1	.....	1	.....	.....	....	1	Martin	2	.....	3	1	.....	....	4
Clay	5	1	11	2	.....	....	14	Owsley	3	1	6	1	.....	....	8
Floyd	1	.....	3	.....	.....	....	3	Perry	3	.....	5	1	1	....	7
Harlan	2	1	3	.....	.....	....	4	Pike	5	3	8	2	.....	....	13
Johnson	3	1	6	.....	.....	....	7	Whittley	3	2	6	3	.....	....	11
Knott	3	3	3	.....	.....	....	6								
Knox	1	.....	3	.....	.....	....	3	17 counties	48	19	84	14	1	....	118
Lawrence	2	.....	5	.....	.....	....	5	Per cent	.....	16.1	71.2	11.9	0.8	....	....
Leslie	6	4	8	.....	.....	....	12								
Letcher	3	1	5	2	.....	....	8								

PROPORTIONATE DEPTHS—JACKSON PURCHASE.

Ballard	1	.....	.....	1	.....	....	1	McCracken	4	.....	6	5	1	....	12
Calloway	2	.....	3	3	.....	....	6	Marshall	2	.....	.....	4	.....	....	4
Carlisle	1	.....	1	1	1	....	3								
Fulton	2	.....	2	.....	1	....	3	8 counties	17	1	14	16	6	3	40
Graves	2	.....	.....	2	.....	3	5	Per cent	.....	2.5	35.0	40.0	15.0	7.5	....
Hickman	3	1	2	.....	3	....	6								

Reporters' remarks:

Adair County: "Have seen springs start just before a big rain." Bourbon County: "Wells abandoned; cisterns used." Campbell County: "Most of the wells went dry in 1908 and some have been no good since. The best of springs 20 years ago have gone dry. Thirty years ago this country was all in timber and very rich; but now it is all cleared off and cultivated down to the rocks and clay, which causes the rainfall to run off too soon and not enough goes into the ground to do any good. The creeks used to run the year 'round; now they stop two or three days after a hard rain." Carroll County: "Several wells failed." Carter County: "Water level has lowered about 2 feet in the last 10 years, as the taking of timber from the land has been rapid." Garrard County: "Most wells abandoned; cisterns used." Hardin County: "Many springs have gone dry that furnished plenty of water 25 years ago." Henderson County: "Springs have gone dry from some unknown cause." Jefferson County: "Springs not nearly so strong or persistent as they were 50 to 75 years ago." Livingston County: "Three springs that never failed 30 years ago only run in wet weather since the land has been cleared. All the dug wells have gone dry. All the springs have changed or gone dry." Marion County: "In 3 or more places where there were strong flowing springs 60 years ago there are no signs of a spring now." Menifee County: "Springs dried up." Metcalfe County: "A spring broke out 3 years ago and furnished lasting water; broke out in new lands just cleared. Before clearing there was no water at all. Springs weakened on account of deforestation." Simpson County: "The average water level is from 5 to 10 feet lower than when this country was all timbered." Wayne County: "Springs frequently broke out in land after clearing and cultivation." Webster County: "Forty or fifty years ago our section was principally supplied by springs; but for the last 20 years the springs have failed to a great extent." Johnson County: "The number and flow of natural springs has decreased to quite a noticeable degree [observation of 52 years]." Knott County: "Since the land is partly cleared up, the level of water is lower." Whittley County: "It is no uncommon thing for springs to start when land is cleared and cultivated." McCracken County: "Years back farmers used spring water; 90 per cent of the springs have dried up."

Other remarks are of related import; most are of local application. In a few cases rise of water in wells is ascribed to exceptional rains;

in most instances in which wells have been abandoned for cisterns it is either noted explicitly or implied that the change was due to the failure of wells. Frequently the relation between clearing and lowering of the water level is recognized, and the changes in ground-water movement indicated by the appearance of springs has attracted attention in different parts of the State. As usual, the remarks and the records in the schedules are consistent.

LOUISIANA.

Parish.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Acadia	*a* 3	1886	3	18	3	9.3	3	8	3			1	4	3	10
	b 3	1905	3	276.3	3	265.7			0					3	10.7
Ascension	*a*		3	21.7	3	6.3	3	8	3	2	5			3	13.7
	b 3	1894	5	240			5	234	0					5	6
Assumption	*a* 1	1888	2	12.5	1	9	1	3	0					2	6.5
	b 2	1900	2	150	2	150	2	150	2					2	0
Avoyelles	*a* 4	1893	15	24	10	6.1	10	6	5	1	1	3	1.5	15	17.8
	b 1	1904	3	193.3	2	28	3	152	2					3	41.3
Bienville	*a* 3	1894	3	16.3	3	5.3	3	4.7	3			2	2	3	11.7
Bossier	*a* 15	1889	19	35.2	10	6	16	4.8	7	1	0.5	6	18	19	31.2
	b 3	1899	3	196.7	3	182	3	182	3					3	14.7
Caddo	*a* 3	1899	13	33.5	6	8.7	13	10.3	6			3	7	13	23.2
Calcasieu	*a* 21	1893	22	24.5	21	7.9	22	4.9	21			12	69	22	19.6
	b 1	1907	4	289	2	293	4	257.5	2			1	6	4	31.5
Caldwell	*a* 2	1908	2	30			2	6	0					2	24
	b		1	500	1	500	1	500	1					1	0
Catahoula	*a* 3	1908	7	34.4	5	6.6	7	7.9	5	1	2			7	26.6
Claiborne	*a* 9	1889	10	23.6	9	4.7	10	4	9			4	7	10	19.6
De Soto	*a* 1	1890	3	27	1	3	3	2.7	1			1	1	3	24.3
East Baton Rouge	*a* 9	1902	13	24.6	9	7.6	12	6.7	8			2	1.5	13	17.5
	b		2	185			2	127.5	0					2	57.5
East Carroll	*a*		4	28.7			4	7	0					4	21.7
East Feliciana	*a* 4	1891	6	30	4	5.7	6	3	4			4	12	6	27
	b 1	1906	2	116	1	34	1	15	0					2	91.5
Franklin	*a* 9	1894	15	36.2	12	8.2	15	7.5	12			3	7	15	28.7
Grant	*a* 8	1890	8	30.6	7	5.4	8	7	7	4	7	2	9	8	23.6
Iberia	*a* 4	1905	4	19	4	10	4	9.6	4	2	5	2	6.5	4	9.4
	b 2	1895	2	243	2	241.5	2	200.5	2			1	82	2	42.5
Iberville	*a* 2	1882	4	14.2	2	3.5	2	4	0					4	10.5
	b 3	1905	9	173.8	3	165	9	162.8	3					9	11
Jackson	*a* 15	1903	15	31.7	15	5.9	11	4.6	11			6	8.5	15	26.3
Jefferson	*a* 2	1898	3	11.7	1	12	2	4.5	0					3	4.7
Lafayette	*a*		1	30			1	14	0					1	16
	b		1	250			1	240	0					1	10
La Salle	*a* 6	1903	8	27.9	6	5.7	8	4.6	6			4	10	8	23.2
Lincoln	*a* 6	1880	10	26.8	8	5.4	10	4	8			5	12	10	22.8
Livingston	*a*		2	20.5	2	11	2	7.5	2			2	7	2	13
Madison	*a*		1	25			1	12	0					1	13
	b 1	1896	2	85	1	70	2	77.5	1					2	7.5
Morehouse	*a* 3	1886	5	37			5	5.8	0					5	31.2
Natchitoches	*a* 9	1900	12	31.5	7	8.4	11	13.9	6			2	23	12	18.3
Ouachita	*a* 11	1895	14	30.4	11	7.6	14	6.7	11	1	1	3	5	14	23.7
	b		1	300			1	300	0					1	0
Plaquemines	*a* 1	1908	1	10	1	5	1	4	1			1	1	1	6
Pointe Coupee	*a* 4	1898	7	23.6	4	6.5	7	7.1	4			1	1	7	16.4
	b 1	1871	2	172.5			2	145	0					2	27.5
Rapides	*a* 5	1898	7	35.1	5	16.2	7	13.1	5					7	22
	b 3	1904	3	77.3	3	11	3	11	3					3	66.3
Red River	*a*		2	30			2	7.5	0					2	22.5
	b 6	1902	6	76.2	3	55.7	6	32.3	3					6	43.8
Richland	*a* 2	1902	10	26.9	2	8	10	10.1	2					10	16.8
Sabine	*a* 8	1894	13	26.1	13	5.2	12	3.6	12	3	6	5	10.5	13	21.3
St. Helena	*a* 3	1901	3	34	3	8.3	3	7	3			2	4	3	27
	b 3	1897	3	74.3	3	7.7	3	6.3	3			2	4	3	68
St. Landry	*a* 7	1871	9	23.1	4	7.2	9	6.8	4					9	16.3
	b 1	1909	5	112.6	5	54.2	5	54.2	5					5	58.4
St. Mary	*a* 2	1875	3	13.3			3	4.3	0					3	9
	b 1	1904	2	240	2	240	2	234	2			2	12	2	6
St. Tammany	*a* 2	1864	2	14	2	5	2	5	2					2	9
	b 2	1906	2	150			2	150	0					2	0
Tangipahoa	*a* 7	1893	9	31.2	7	6.9	9	6.8	7					9	24.4
	b 5	1905	9	270.1	9	270.1	9	270.1	9					9	0
Terrebonne	*a*		2	11			2	4.5	0					2	6.5
	b 1	1894	1	200	1	20	1	6	1			1	14	1	194

LOUISIANA—Continued.

Parish.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Union	*a* 2	1888	2	30	2	6.5	2	4	2	.....	.....	2	5	2	26
Vernon	*a* 3	1893	9	36.9	7	7.3	9	6.4	7	1	1	6	10	9	30.4
Washington	*a* 1	1880	2	25	1	8	2	7.5	1	.....	.....	1	3	2	17.5
	b 1	1890	3	78.3	.....	.....	3	31.7	0	.....	.....	.....	.....	3	46.7
Webster	*a* 8	1890	11	24.2	8	3.6	10	3.1	7	.....	.....	2	3	11	21
West Baton Rouge	*b* 3	1905	5	156.8	5	142.2	5	142.2	5	.....	.....	.....	.....	5	14.6
West Feliciana	*a*	.....	3	30.7	.....	.....	3	9.3	0	.....	.....	.....	.....	3	21.3
Winn	*a* 5	1900	5	31	5	5.6	5	4.8	5	.....	.....	2	4	5	26.2
Total	*a* 213	1893.6	327	28.0	224	6.9	307	6.5	204	16	28.5	89	252.5	327	21.5
	b 47	1901.1	81	182.4	51	155.9	77	151.3	47	0	0.0	7	118.0	81	28.4
Aggregate	260	1894.1	408	.....	275	.....	384	.....	251	16	28.5	96	370.5	408	22.9

PROPORTIONATE DEPTHS.

Parish.	Cor.	A.	B.	C.	D.	E.	Total.	Parish.	Cor.	A.	B.	C.	D.	E.	Total.
Acadia	4	2	4	.....	.....	.....	6	Morehouse	2	.....	2	3	.....	.....	5
Ascension	2	2	6	.....	.....	.....	8	Natchitoches	6	2	9	1	.....	.....	12
Assumption	1	3	1	.....	.....	.....	4	Ouachita	5	2	10	3	.....	.....	15
Avoyelles	6	5	8	4	1	.....	18	Plaquemines	1	1	.....	.....	.....	.....	1
Bienville	1	.....	3	.....	.....	.....	3	Pointe Coupee	3	.....	8	1	.....	.....	9
Bassier	8	1	12	9	.....	.....	22	Rapides	5	.....	6	2	2	.....	10
Caddo	5	1	9	3	.....	.....	13	Red River	3	.....	5	.....	3	.....	8
Calcasieu	9	6	13	7	.....	.....	26	Richland	4	.....	10	.....	.....	.....	10
Caldwell	1	1	2	.....	.....	.....	3	Sabine	4	1	11	1	.....	.....	13
Catahoula	3	1	2	4	.....	.....	7	St. Helena	2	.....	2	2	2	.....	6
Claiborne	3	1	8	1	.....	.....	10	St. Landry	5	2	6	4	2	.....	14
De Soto	2	.....	3	.....	.....	.....	3	St. Mary	3	3	2	.....	.....	.....	5
East Baton Rouge	4	.....	14	.....	.....	1	15	St. Tammany	1	3	1	.....	.....	.....	4
East Carroll	1	.....	3	1	.....	.....	4	Tangipahoa	6	12	3	3	.....	.....	18
East Feliciana	2	1	3	2	2	.....	8	Terrebonne	1	2	.....	.....	.....	1	3
Franklin	7	.....	11	4	.....	.....	15	Union	1	.....	2	.....	.....	.....	2
Grant	3	1	5	2	.....	.....	8	Vernon	2	2	3	2	2	.....	9
Iberia	2	3	2	.....	1	.....	6	Washington	1	.....	2	3	.....	.....	5
Iberville	2	4	9	.....	.....	.....	13	Webster	3	1	9	1	.....	.....	11
Jackson	5	1	8	6	.....	.....	15	West Baton Rouge	2	1	4	.....	.....	.....	5
Jefferson	3	3	.....	.....	.....	.....	3	West Feliciana	1	1	1	1	.....	.....	3
Lafayette	1	.....	2	.....	.....	.....	2	Winn	2	.....	3	2	.....	.....	5
La Salle	2	.....	6	2	.....	.....	8								
Lincoln	3	.....	9	1	.....	.....	10	48 counties	146	70	246	75	15	2	408
Livingston	2	.....	2	.....	.....	.....	2	Per cent	.....	17.1	60.3	18.4	3.7	0.5	.....
Madison	2	1	2	.....	.....	.....	3								

Remarks by reporters:

Acadia Parish: "Several strong springs stopped flowing after the irrigation wells had been pumped a few weeks and resumed flow after pumps had been shut off some time. This holds for springs several miles from the nearest well." Avoyelles Parish: "The depth of wells has varied very little since the country was settled. Most of the forest trees are here yet, and the land is not much used." Calcasieu Parish: "Section devoted to rice culture, the crop being irrigated from wells. The water level has fallen at least 5 feet in 15 years." "In 1897 the water stood within 3 feet of the surface, but many deep wells have been put down for rice irrigation, and now the water level stands from 22 to 25 feet below the surface." "Springs and wells failing fast. This country was covered with very large pine timber. In the last five years this has been cut off, and if the water continues to sink as it has in the last two years those who will have a supply must go down deep." "Locality is cut-over pine land (denuded in some places); have known for 30 years a very bold spring which ceased running 2 years ago; another also dry for 5 years. Rivers and creeks are lower than in past

years; they rise as high in sudden downpours, but run down sooner. Creeks that formerly ran all year now run only three-fourths of the time." Grant Parish: "Observation as medical man 38 years; country is gradually becoming drier; lakes, lagoons, and bayous drying up or running out; wells becoming deeper." Ouachita Parish: "Sometimes springs and wells dry up, but generally can be regained by digging deeper." Pointe Coupee Parish: "The water level has not shown any important variation within 25 or 30 years." Rapides Parish: "There has been little change in either wells or springs in the last 40 years." Union Parish: "A good many wells are failing to supply the water they did a few years ago; some have gone dry." Vernon Parish: "Water lower than for seven years."

Several reporters in low-lying parishes adjacent to the Mississippi or its bayous note that the level of water in wells varies with the stage of the river. Generally the lowering noted, both in records and in remarks, is confined to the higher grounds, especially where these have been cleared, though in some cases lowering of the subsoil water level beneath the flat prairies is ascribed to extensive pumping.

MAINE.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Androscoggin	*a* 3	1875	4	14	3	3.7	4	3.1	3	....	.....	1	0.5	4	10.9
Aroostook	*a* 3	1889	4	15.5	4	10.2	4	6.2	4	....	.....	4	16	4	9.2
	b 5	1894	5	102.6	5	73.8	5	73.8	5	....	.....	....	.....	5	28.8
Hancock	*a* 2	1908	2	8	1	4	2	4	1	....	.....	....	.....	2	4
Lincoln	*a* 2	1882	3	24.3	2	3.5	3	3.7	2	....	.....	1	1	3	20.7
Oxford	*a* 4	1884	4	11.2	3	2.3	4	1.6	3	....	.....	3	3.5	4	9.6
Penobscot	*a* 4	1848	6	34.2	3	13.3	6	9.3	3	....	.....	1	2	6	24.8
	b 1	1888	1	66	....	.....	1	42	0	....	.....	....	.....	1	24
Sagadahoc	*a* 5	1877	5	20.4	5	9.2	5	6.4	5	....	.....	5	14	5	14
Somerset	*a* 3	1893	5	15.4	4	7.5	5	6	4	....	.....	2	4	5	9.4
Waldo	*a* 9	1872	9	18	6	5	9	3.2	6	....	.....	4	13	9	14.8
York	*a* 3	1843	3	13.3	3	4	3	2.5	3	....	.....	3	4.5	3	10.8
Total	*a* 38	1874.9	45	18.6	34	6.7	45	4.8	34	0	0.0	24	58.5	45	13.8
	b 6	1893.0	6	96.5	5	73.8	6	68.5	5	0	0.0	0	0.0	6	28.0
Aggregate	44	1877.4	51	.....	39	.....	51	.....	39	0	0.0	24	58.5	51	15.5

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	Total.	County.	Cor.	A.	B.	C.	D.	Total.
Androscoggin	2	2	2	....	....	4	Somerset	4	3	2	....	....	5
Aroostook	4	2	6	1	....	9	Waldo	2	1	7	1	....	9
Hancock	1	2	....	....	....	2	York	1	....	3	....	....	3
Lincoln	1	1	1	1	....	3							
Oxford	2	1	3	....	....	4	10 counties.	22	13	34	3	1	51
Penobscot	3	1	5	....	1	7	Per cent	....	25.5	66.7	5.9	1.9	....
Sagadahoc	2	....	5	....	....	5							

Reporters' remarks:

Penobscot County: "A few springs have failed, but by using dynamite they can be made good as ever; streams are gradually drying up owing to the fact that forests have been cleared off." Waldo County: "A spring failed 2 years ago."

MARYLAND.

EASTERN.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Anne Arundel	a 7	1886	8	32	8	4.7	8	4.2	8	....	.....	3	4	8	27.7
	b	.....	3	125	1	5	3	31.7	1	....	.....	....	.....	3	93.3
Calvert	a	.....	2	50	....	.....	2	6	0	....	.....	....	.....	2	44
	b	.....	2	250	....	.....	2	250	0	....	.....	....	.....	2	0
Caroline	a 3	1896	7	21	3	4	7	6.3	3	....	.....	....	.....	7	14.7
Cecil	a 5	1858	10	34.3	5	9	10	5.5	5	....	.....	3	8	10	28.8
Dorchester	a 4	1887	6	18.3	4	9	6	5.3	4	....	.....	3	8	6	13
	b 2	1903	5	474	5	470	4	517.5	4	....	.....	....	.....	5	4
Prince Georges	a 3	1872	3	33.7	3	5.8	3	5.3	3	....	.....	1	1.5	3	28.3
St. Marys	a 3	1893	3	12.7	3	2.5	3	2.5	3	....	.....	....	.....	3	10.2
Somerset	a 5	1897	5	16.6	....	.....	5	6.6	0	....	.....	....	.....	5	10
Talbot	a 2	1883	9	13.8	2	4.5	9	3.7	2	....	.....	....	.....	9	10.1
	b	.....	2	406.5	....	.....	2	406.5	0	....	.....	....	.....	2	0
Wicomico	a 3	1885	3	40	3	28.7	3	28.3	3	....	.....	1	1	3	11.7
Worcester	a 3	1900	3	13.3	3	4.7	3	4.7	3	....	.....	....	.....	3	8.7
Total	a 38	1885.0	59	24.8	34	7.8	59	6.2	34	0	0.0	11	22.5	59	18.6
	b 2	1903.0	12	338.2	6	392.5	11	316.2	5	0	0.0	0	0.0	12	25.5

WESTERN.

Allegany	a 3	1853	3	40	3	15	3	12	3	....	.....	3	9	3	28
	b 1	1900	1	75	1	25	1	25	1	....	.....	....	.....	1	50
Baltimore	a 17	1866	20	40.4	15	7.6	20	5.9	15	....	.....	12	37	20	34.5
	b 2	1892	3	225	2	85	2	70	2	....	.....	2	30	2	120
Carroll	a 17	1874	20	46.2	20	7.6	19	1.7	19	....	.....	19	109.5	20	44.1
Frederick	a 20	1860	20	39.5	18	7.3	20	5.3	18	....	.....	10	41.5	20	34.2
	b 7	1898	7	79.1	5	48.2	7	29	5	....	.....	3	83	7	50.1
Garrett	a 5	1891	6	23.2	6	9.1	6	7.3	6	....	.....	6	10.5	6	15.8
Harford	a 3	1857	5	32.2	3	7.7	5	4.2	3	....	.....	3	10	5	28
	b 2	1888	2	80	2	25	2	15	2	....	.....	2	20	2	65
Howard	a 5	1857	10	38.5	7	10.4	10	6.1	7	2	2	5	36	10	32.4
	b	.....	2	70	....	.....	2	6.5	0	....	.....	....	.....	2	63.5
Montgomery	a 3	1882	3	50	3	10.3	3	2	3	....	.....	3	25	3	48
Washington	a 2	1887	2	50.5	2	10.5	2	3.7	2	....	.....	2	13.5	2	46.7
	b 2	1904	2	183.5	....	.....	2	35	0	....	.....	....	.....	2	148.5
Total	a 75	1866.4	89	40.2	77	8.4	88	4.9	76	2	2.0	63	292.0	89	35.3
	b 14	1896.7	17	116.5	10	48.6	16	30.6	10	0	0.0	7	133.0	16	74.7
State total	a 113	1873.6	148	34.1	111	8.2	147	5.4	110	2	2.0	74	314.5	148	28.6
	b 16	1897.5	29	207.9	16	177.6	27	146.6	15	0	0.0	7	133.0	28	53.4
Aggregate	129	1875.2	177	.....	127	.....	174	.....	125	2	2.0	81	447.5	176	32.6

PROPORTIONATE DEPTHS—EASTERN.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Anne Arundel	4	1	4	3	2	1	11	Somerset	2	4	1	....	....	....	5
Calvert	1	2	1	....	1	....	4	Talbot	5	7	4	....	....	....	11
Caroline	3	....	7	....	....	....	7	Wicomico	1	....	3	....	....	....	3
Cecil	3	1	5	3	1	....	10	Worcester	1	2	1	....	....	....	3
Dorchester	3	8	2	1	....	....	11								
Prince Georges	2	....	2	1	....	....	3	11 counties	26	27	31	8	4	1	71
St. Marys	1	2	1	....	....	....	3	Per cent	....	38.0	43.7	11.3	5.6	1.4	....

PROPORTIONATE DEPTHS—WESTERN.

Allegany	2	....	3	1	....	....	4	Howard	5	1	4	6	1	....	12
Baltimore	9	....	10	9	2	1	22	Montgomery	1	....	....	3	....	....	3
Carroll	6	....	4	14	2	....	20	Washington	2	....	....	2	....	2	4
Frederick	10	1	9	14	3	....	27								
Garrett	2	1	4	1	....	....	6	9 counties	41	4	35	54	9	3	105
Harford	4	1	1	4	1	....	7	Per cent	....	3.8	33.3	51.4	8.6	2.9	....

Reporters' remarks:

Baltimore County: "Water has fallen generally all over the county." "Some springs have gone entirely dry; some wells are dry and others nearly so." "Of dug wells some are dry and others failing; some springs are failing rapidly, others are normal." Carroll County: "Wells, springs, and streams lower than for the past 65 years." "Forty years ago a well 40 feet deep was a deep well, but now we dig 100 feet." "The water is decreasing more each year as the timber is taken off and the swamps are drained; there has been at least 25 per cent decrease in the past 25 years." "Wells and springs are going dry very fast." Frederick County: "A number of wells have been deepened in order to have a better supply." Harford County: "Springs that 3 or 4 years ago would run the year 'round without regulation now have to have regulators attached and only operate about three-fifths of the time." "No change observed in 40 years." Howard County: "Springs going dry." "Wells have dropped in water level over 3½ feet." "More springs have failed than for about 55 years, and the end is not yet." Wicomico County: "The conditions are about the same as they were 30 years ago."

MASSACHUSETTS.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Barnstable	*a* 5	1861	7	35.1	5	3.9	7	3.8	5	1	0.5	1	0.5	7	31.4
Berkshire	*a* 1	1835	1	30	1	10	1	10	1	....	.....	....	.....	1	20
Bristol	*a* 3	1830	3	22	1	4	3	3.2	1	....	.....	1	1	3	18.8
Essex	*a*	.....	4	22.5	4	4.1	4	3.4	4	....	.....	1	3	4	19.1
Franklin	*a* 13	1862	28	17.5	12	4.3	28	2.5	12	....	.....	7	23	28	15
Hampden	*a* 1	1896	2	25	1	4	2	4.2	1	....	.....	1	0.5	2	20.7
	b 1	1895	1	115	1	95	1	95	1	....	.....	....	.....	1	20
Hampshire	*a* 9	1829	11	22.1	8	5.8	11	3.6	8	....	.....	3	19	11	18.5
Worcester	*a* 3	1869	3	27.7	3	11.7	3	5	3	....	.....	3	20	3	22.7
	b 2	1907	2	145	2	20	2	17.5	2	....	.....	1	5	2	127.5
Total	*a* 35	1851.1	59	22.0	35	5.4	59	3.3	35	1	0.5	17	67.0	59	18.6
	b 3	1903.0	3	135.0	3	45.0	3	43.3	3	0	0.0	1	5.0	3	91.7
Aggregate	38	1855.2	62	.....	38	.....	62	.....	38	1	0.5	18	72.0	62	22.3

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Barnstable	3	1	2	4	....	....	7	Hampshire	4	1	10	....	....	....	11
Berkshire	1	....	1	....	....	....	1	Worcester	1	1	1	1	1	1	5
Bristol	3	1	2	....	....	....	3								
Essex	3	1	2	1	....	....	4	8 counties	22	12	40	8	1	1	62
Franklin	5	7	19	2	....	....	28	Per cent	....	19.4	64.5	12.9	1.6	1.6	....
Hampden	2	....	3	....	....	....	3								

Reporters' remarks:

Bristol County: "In the past 40 or 50 years water has fallen an average of about 1 foot." Franklin County: "Deerfield River has very much less water than 50 years ago." Hampshire County: "No perceptible change in wells or springs within my recollection, and I am 75 years old." "Spring never has failed in 85 years of use." Worcester County: "Many old wells 30 to 50 feet deep, water 10 to 20 feet, are now dry; springs have gone dry."

MICHIGAN.

LOWER.

County.	Dates.		Wells.		Original water.		Present water.		Bi-static.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Alcona	*a* 11	1898	11	20.4	8	4.9	11	4.8	8			1	1	11	15.5
	b 1	1910	1	81			1	74	0					1	7
Allegan	*a* 15	1886	20	42.5	17	8.7	17	11.2	14			3	5	20	32
	b 6	1889	6	121.3	6	58.3	3	38.3	3			1	20	6	66.3
Alpena	*a* 11	1892	11	21.2	11	9.3	11	4.5	11			11	52	11	16.6
Antrim	*a* 2	1886	2	40	2	7	2	5	2			2	4	2	35
	b 4	1894	4	101.7	1	10	4	37.5	1			1	10	4	64.2
Arenac	*a* 2	1893	2	18.5	2	11.5	2	3	2			1	17	2	15.5
	b 5	1908	8	110.6	6	109.2	4	53.2	2					8	15.7
Barry	*a* 10	1884	11	37.7	9	8.2	10	7.6	8	2	5	1	10	11	28.9
	b 2	1905	2	95	2	20	2	16.5	2			1	7	2	78.5
Bay	*a* 5	1875	9	16.7	9	9.4	8	4.2	7	1	1	6	24	9	9.8
	b 5	1905	10	113.4	10	83.1	5	107.4	6			1	16	10	31.9
Benzie	*a* 2	1891	2	38	2	7	2	7	2					2	31
	b 7	1895	7	160.9	7	77	4	20.7	4			1	5	7	84.6
Berrien	*a* 4	1880	5	38	5	10.4	5	9.6	5			2	4	5	28.4
	b 3	1896	3	122.7			3	61.7	0					3	61
Branch	*a* 11	1862	14	23.4	11	12.8	14	9.9	11			4	22	14	13.4
Calhoun	*a* 9	1869	9	34.7	8	9.3	9	8.2	8			4	10.5	9	26.4
	b 8	1891	8	89	7	46.9	6	40.3	5			1	8	8	48.1
Cass	*a* 6	1864	9	41	6	4.3	9	7.1	5	3	4	1	2	9	33.9
	b 4	1887	4	75.5	4	26	4	25.5	4			2	2	4	50
Charlevoix	*a* 7	1890	7	32.7	7	6.4	7	6.4	7					7	26.3
	b 5	1905	5	143	5	12.4	5	12	5			1	2	5	131
Cheboygan	*a* 1	1903	2	44.5	2	4.5	1	4	1					2	40
	b 2	1907	2	159	2	11	1	12	1					2	148
Clare	*a* 3	1901	6	18.7	1	7	4	8.5	1					4	8
	b 6	1904	6	81.1	5	26	5	26	5					5	57.2
Clinton	*a* 12	1886	16	27.2	13	11.8	14	11	13			11	39.5	16	17.7
	b 4	1898	4	138.2	1	90	4	101.2	1			1	20	4	37
Crawford	*a* 4	1899	4	50.7	4	5.2	1	0	1			1	5	4	46.7
	b 5	1903	6	138.7	5	9.6	6	9.3	5					6	126.5
Eaton	*a* 13	1886	13	29.5	13	9.8	13	8.2	13			4	21	13	21.3
	b 5	1904	5	82	3	39.3	5	32	3			3	13	5	50
Emmet	*a* 1	1906	3	58.7			3	13.3	0					3	45.3
	b		3	124.7			3	12	0					3	112.7
Genesee	*a* 9	1871	14	20.8	14	5.9	9	2.7	9			7	24	14	15.7
	b 7	1899	8	109.2	8	81.5	5	65.4	5			4	15	8	29.6
Gladwin	*a* 9	1894	9	27.7	4	22.7	9	15.4	4			1	4	9	12.2
	b 10	1906	12	68.2	6	54	12	50.2	6					12	18.1
Grand Traverse	*a* 7	1888	8	39.1	3	6.7	8	8.7	3			1	2	8	30.4
	b 5	1897	5	88.4	5	29.6	5	29.6	6					5	58.8
Gratiot	*a* 9	1888	11	25.5	8	12.7	10	11.1	8			4	10.5	10	13.9
	b 8	1902	8	126.6	7	136.9	7	136.9	7					7	27.6
Hillsdale	*a* 15	1884	15	27.9	13	9.7	14	7	12			5	25	15	20.4
	b 4	1892	4	144.2	2	40	2	30.5	2			2	19	2	42.5
Huron	*a* 5	1884	5	20.8	5	10.2	5	3.8	5			5	32	5	17
	b 5	1899	5	139.4	5	130.4	5	129.8	5			1	3	5	9.6
Ingham	*a* 3	1882	6	32.5	6	9.2	6	9.2	6					6	23.3
	b 6	1894	7	79	3	53.3	7	56.9	3					7	22.1
Ionia	*a* 5	1889	5	33.6	5	7.3	5	6	5			1	6.5	5	27.6
Iosco	*a* 2	1895	2	60	2	21.5	2	17	2			2	5	2	41
	b 3	1902	3	92.7	3	66.7	3	65.3	3			1	4	3	27.3
Isabella	*a* 9	1892	9	37.6	9	18.9	9	16.1	9			4	25	9	21.9
	b 4	1906	4	110	1	80	4	35	1					4	75
Jackson	*a* 11	1874	16	32.3	13	6.6	16	5.9	13			2	2	16	26.4
	b 9	1894	9	84.7	6	63.8	9	59.2	6					9	25.4
Kalamazoo	*a* 7	1872	10	32.1	4	4.1	7	4.1	4			3	10.5	7	32
	b 4	1869	5	74	4	14.7	5	14.2	4			2	13	5	59.8
Kalkaska	*a* 13	1889	13	64.3	10	11.1	10	10.9	10			1	2	10	58.8
Kent	*a* 16	1884	18	31.1	16	10.4	18	10.1	16			4	4.5	18	20.9
	b 3	1907	5	104	2	55	2	55	2					2	65
Lake	*a* 6	1890	6	29	6	5.3	6	4.7	6			1	5	6	24.7
	b 4	1904	4	94.7	4	12.7	4	12.7	4					4	82
Lapeer	*a* 11	1879	15	30.6	13	9.2	13	9.7	11			4	17	15	21.4
	b 5	1897	5	98.4	2	87.5	5	69	2					5	29.4
Leelanau	*a* 2	1898	2	40	2	7	2	6	2			1	2	2	34
	b 11	1902	11	129.9	8	21.9	10	23.8	8			1	5	10	97.1
Lenawee	*a* 19	1868	21	26.3	11	3.3	20	3.6	10			3	8	21	22.7
	b 12	1898	12	93.6	9	54.2	12	52.5	9			3	34	12	41.1
Livingston	*a* 6	1873	7	28.4	3	5.3	7	7.6	3			1	2	7	20.9
	b 5	1902	5	83.8	3	37	5	51	3			1	1	5	32.8
Macomb	*a* 12	1880	14	22.5	11	13.8	14	10.8	11			6	14	14	11.7
	b 2	1897	2	90	1	100	2	85	1					2	5
Manistee	*a* 3	1906	3	36.7	3	7			0					3	29.7
Mason	*a*		9	30.9	6	12.5	9	10.7	6			2	7	9	20.2
	b 6	1900	6	140.3	6	30.3	6	30.3	6					6	110
Mecosta	*a* 13	1892	19	39.6	15	10.1	18	7.5	14			7	43	19	32
	b 5	1887	5	114.4	2	42.5	3	25	0					5	82.4

MICHIGAN—Continued.

LOWER—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Midland	a	11	1898	11	12	11	5.3	8	3.7	8			4	4	11	7.1
	b	6	1905	6	126.5	6	123.7	6	121.3	6			1	14	6	5.2
Missaukee	a	6	1894	7	32.1	7	10.7	5	12	5			2	6	7	22.3
	b	11	1893	11	113.7	11	21.2	9	22.6	9					11	92.5
Monroe	a	10	1865	10	20.7	10	11.8	9	5	9			9	59	10	14.7
	b	8	1903	8	67	8	46.5	6	45.8	6			3	32	8	24.5
Montcalm	a	12	1881	21	29.7	13	7.2	20	6	12			3	6	21	23.8
Montmorency	a	1	1890	1	35	1	3	1	3	1					1	32
Muskegon	a	7	1891	7	27.9	4	7.2	7	6.9	4					7	21
Newaygo	a	5	1894	6	43.3	6	18.8	6	19.2	6	1	2			6	24.2
	b	1	1906	3	91.7	3	53	3	53	3					3	38.7
Oakland	a	15	1870	18	35.9	11	6.9	17	5.2	10			3	11.5	18	30.9
	b	8	1895	8	107.6	7	59.1	6	45.7	5			1	80	8	64
Oceana	a	7	1888	7	34.7	7	13.9	7	13.6	7			3	2.5	7	21.1
	b	11	1896	11	97.1	11	17.3	11	17.1	11			1	2	11	80
Ogemaw	a	3	1904	3	41.7	3	20.7	3	20.7	3					3	21
	b	1	1880	2	161	1	17	2	58.5	1					2	102.5
Osceola	a	2	1899	4	22.5	4	8.7	2	3	2			1	2	4	14.2
	b	8	1903	9	149.9	8	44.9	8	32.6	7			1	3	9	107.4
Oscoda	a	1	1884	1	25	1	5	1	5	1					1	20
	b	1	1894	1	150	1	40	1	40	1					1	110
Otsego	a	1	1880	1	18	1	5			0					1	13
	b	2	1899	2	171.5			2	17	0					2	154.5
Ottawa	a	10	1885	14	25.1	10	9.	12	8.2	8					14	17.6
	b	1	1906	4	90	2	90	4	49.7	2			1	5	4	40.2
Presque Isle	a	7	1892	7	27.1	7	6.4	7	4.6	9			5	12.5	7	22.5
	b	3	1907	3	101	3	48.3	3	46.7	3			1	5	3	54.3
Roscommon	a	7	1897	11	28.1	7	15	11	12.3	7			1	16	11	15.8
	b	1	1892	2	101.5	1	30	2	70	1			1	10	2	31.5
Saginaw	a	2	1876	2	16	2	9	2	3	2			2	12	2	13
	b	22	1900	22	116	22	89.7	21	92.4	21			3	23	22	27.3
St. Clair	a	16	1890	19	23.9	17	13.5	18	9.4	16			9	55	19	14.5
	b	4	1902	7	107.7	5	72.6	5	68.6	5			1	20	5	37.2
St. Joseph	a	9	1895	10	30.6	10	8.2	10	6.8	10	2	1.5	4	15	10	23.7
	b	4	1894	5	96.8	5	49	4	40.7	4	1	1	3	23	5	52.2
Sanilac	a	21	1887	21	21.9	21	8.7	21	7	21			12	36	21	14.9
	b	7	1905	10	91.5	6	53.2	7	47.1	5			1	1	8	27.1
Shiawassee	a	11	1888	11	30.2	10	12.6	11	11.9	10	1	1	2	8	11	18.2
	b	5	1896	5	117.8	2	67	5	62.8	2					5	55
Tuscola	a	8	1883	9	24.7	8	13.6	9	8.7	8			6	38.5	9	16
	b	20	1893	23	150.4	18	127	23	125.5	18			12	109	23	24.9
Van Buren	b	6	1884	6	68.5	3	56.3	6	61.5	3					6	7
Washtenaw	b	2	1905	2	76.5	2	35	2	35	2					2	41.5
Wayne	a	10	1899	14	20.8	13	12.1	14	5.9	13			9	84	14	14.9
	b	6	1877	8	73.7	6	61.3	7	47.1	5			4	100	8	31.5
Wexford	a	5	1894	5	34.2	5	6.8	5	6.8	5					5	27.4
	b	7	1901	7	157.3	7	20.6	7	20.6	7					7	136.7
Total	a	508	1884.7	613	30.1	501	9.8	566	8.2	463	10	14.5	192	836.0	604	22.0
	b	335	1897.8	374	110.9	289	60.4	328	56.0	257	1	1.0	62	624.0	362	52.5

UPPER.

Alger	a	9	1903	9	24.7	9	6	9	4.5	9	1	1	6	14.5	9	20.2
Baraga	a	5	1890	5	20.2	5	4.8	5	4.3	5			3	2.5	5	15.9
Chippewa	a	8	1898	8	43.9	8	4.8	8	5.3	8	2	4			8	38.6
	b	2	1902	2	102.5	2	75	2	75	2					2	27.5
Delta	a	1	1902	1	36	1	28	1	20	1			1	8	1	16
Dickinson	a	1	1906	1	25	1	12	1	15	1	1	3			1	10
	b	2	1901	2	71.5	2	32.5	2	32.5	2					2	39
Houghton	a	5	1895	7	21.6	7	6	7	3.9	7			7	15	7	17.7
Iron	a	7	1900	7	48.7	7	8.4	7	3.8	7			4	32.5	7	44.9
Luce	b			3	68.3			3	25	0					3	43.3
Mackinac	a	3	1890	3	40.7	1	32	3	21.3	1					3	19.3
	b	2	1909	2	200.5	1	80	2	103	1					2	97.5
Marquette	a	3	1905	6	38.5	6	26	3	7	3					6	12.5
Menominee	a	13	1894	16	23.9	16	8.4	16	4.5	16			15	62.5	16	19.5
	b	7	1898	7	62.3	7	33.4	7	27.4	7			7	41.5	7	34.9
Ontonagon	a	3	1903	3	25	3	8.7	3	8.3	3			1	1	3	16.7
Schoolcraft	a	1	1900	2	35	1	10	2	7	1					2	28
	b			3	72			3	46.7	0					3	25.3
Total	a	59	1897.5	68	31.0	65	9.7	65	6.0	62	4	8.0	37	136.0	68	23.3
	b	13	1901.1	19	84.5	12	44.0	19	43.6	12	0	0.0	7	41.5	19	41.0
State total	a	567	1886.2	681	30.2	566	9.7	631	7.9	525	14	22.5	229	972.0	672	22.1
	b	348	1898.0	393	109.6	301	59.7	347	59.7	269	1	1.0	69	665.5	381	51.9
Aggregate		915	1890.7	1,074		867		978		794	15	23.5	298	1,637.5	1,053	32.9

MICHIGAN—Continued.

PROPORTIONATE DEPTHS—LOWER.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Alcona	4	6	5	1	.....	....	12	Leelanau	4	.....	2	1	6	3	12
Allegan	9	5	7	11	2	1	26	Lenawee	9	2	20	10	1	....	33
Alpena	4	2	8	1	.....	....	11	Livingston	6	1	8	2	1	....	12
Antrim	3	.....	1	4	.....	1	6	Macomb	7	6	10	.....	.....	....	16
Arenac	4	7	1	2	.....	....	10	Manistee	1	.....	2	1	.....	....	3
Barry	5	1	4	6	2	....	13	Mason	6	1	8	2	.....	4	15
Bay	7	5	12	1	.....	1	19	Macosta	7	2	8	10	2	2	24
Benzie	3	4	.....	1	1	3	9	Midland	6	12	5	.....	.....	....	17
Berrien	4	1	2	4	1	....	8	Missaukee	7	1	5	4	2	6	18
Branch	5	2	12	.....	.....	....	14	Monroe	6	2	13	3	.....	....	18
Calhoun	6	2	5	7	3	....	17	Montcalm	7	3	12	6	.....	....	21
Cass	7	.....	4	6	3	....	13	Montgomery	1	.....	.....	1	.....	....	1
Charlevoix	4	2	3	1	4	2	12	Muskegon	3	.....	6	1	.....	....	7
Cheboygan	2	.....	1	.....	1	2	4	Newaygo	3	1	4	3	1	....	9
Clare	4	4	.....	2	3	....	9	Oakland	11	2	12	5	6	1	26
Clinton	9	1	14	5	.....	....	20	Oceana	6	.....	6	5	2	5	18
Crawford	4	.....	3	.....	.....	7	10	Ogemaw	2	.....	3	.....	1	1	5
Eaton	6	1	9	8	.....	....	18	Osceola	4	1	4	2	4	2	13
Emmet	2	.....	.....	3	1	2	6	Oscoda	1	.....	1	.....	.....	1	2
Genesee	6	1	17	3	1	....	22	Otsego	2	.....	1	.....	.....	2	3
Gladwin	4	5	15	1	.....	....	21	Ottawa	6	4	10	3	1	....	18
Grand Traverse	5	2	.....	9	2	....	13	Presque Isle	3	2	4	3	1	....	10
Gratoit	6	7	8	1	.....	1	17	Roscommon	4	5	6	1	1	....	13
Hillsdale	7	1	12	4	.....	....	17	Saginaw	9	14	4	3	.....	3	24
Huron	4	3	6	1	.....	....	10	St. Clair	9	7	15	1	1	....	24
Ingham	5	2	8	3	.....	....	13	St. Joseph	5	.....	10	4	.....	1	15
Ionia	2	.....	4	.....	1	....	5	Sanilac	10	10	17	1	1	....	29
Iosco	2	1	2	2	.....	....	5	Shiawassee	6	2	10	2	1	1	16
Isabella	4	2	6	2	2	1	13	Tuscola	11	9	16	4	3	....	32
Jackson	7	3	17	2	3	....	25	Van Buren	2	4	2	.....	.....	....	6
Kalamazoo	4	.....	5	3	4	....	12	Washtenaw	1	.....	1	1	.....	....	2
Kalkaska	5	.....	.....	8	1	1	10	Wayne	9	3	16	2	1	....	22
Kent	7	.....	18	1	1	....	20	Wexford	4	.....	2	4	.....	6	12
Lake	4	1	4	1	3	1	10	68 counties.	348	170	465	195	75	61	966
Lapeer	6	5	9	6	.....	....	20	Per cent	.....	17.6	48.1	20.2	7.8	6.3	....

PROPORTIONATE DEPTHS—UPPER.

Alger	3	.....	8	1	.....	....	9	Mackinac	1	.....	3	.....	2	....	5
Baraga	2	2	2	1	.....	....	5	Marquette	2	1	5	.....	.....	....	6
Chippewa	3	2	4	1	3	....	10	Menominee	8	3	13	5	2	....	23
Delta	1	.....	1	.....	.....	....	1	Ontonagon	1	1	2	.....	.....	....	3
Dickinson	1	.....	2	1	.....	....	3	Schoolcraft	3	.....	3	2	.....	....	5
Houghton	3	2	4	1	.....	....	7								
Iron	3	.....	2	3	2	....	7	13 counties.	32	11	49	18	9	....	87
Luce	1	.....	.....	3	.....	....	3	Per cent	.....	12.6	56.3	20.7	10.4	....	....

Reporters' remarks:

Alcona County: "Some wells have had to be sunk deeper to obtain an adequate supply of water." Alpena County: "Some wells would not hold water at original depth and had to be deepened." "Water is at least 3 feet lower than it was 5 years ago." Arenac County: "There has been a marked decrease in the flow from wells since farmers are using windmills." Barry County: "If any change, water is 18 inches higher than 30 years ago." Bay County: "In an early day dug wells supplied us with water, but since the timber has been cut the supply can only be obtained from deep wells." Benzie County: "We notice that the streams that empty into the river carry less water as the timber is removed." Branch County: "All wells are lower than 10 years ago." Calhoun County: "Nearly all dug wells have gone dry and have been driven deeper." "Old-time wells have been deepened by drilling in the bottom." Cass County: "The water has gone down 2 or 3 feet in 50 years; springs have gone dry, perhaps on account of the timber being cut off." Cheboygan County: "Some wells went dry, but we dug deeper and got lots of water." Clinton County: "All wells of early date were dug, and as they went dry pipes were driven or drilled to the depth necessary." "In a great many cases old wells have gone dry and new wells have to be dug or old ones deepened." "The ground water level gets lower every

year." Crawford County: "All lakes have lowered about 8 or 10 feet in the past 25 years." Eaton County: "The water has fallen about 3 feet in the last 25 years; about all the old dug wells have failed." Genesee County: "Most wells have shown a shrinkage in water supply in 25 years; most lakes fed by springs are being reduced in volume." Grand Traverse County: "One well abandoned because of failure of supply; one spring failed." Gratiot County: "The water level is 3 or 4 feet lower than 25 years ago." Huron County: "Dug wells were formerly used; they steadily kept shrinking yearly." Isabella County: "Many springs have nearly ceased to flow." "All dug wells went dry in past 10 years, and are now drilled; what is true of these wells is true of dozens of others since the land has been cleared." Kalkaska County: "In about 1890 we had to sink about 10 feet deeper." Lapeer County: "Since the settlement of the country in the early part of the fifties, the water level has lowered from 6 to 10 feet in most wells." Midland County: "The wells have had to be deepened." Missaukee County: "Thirty years ago we had water at 31 feet, later at 34 feet; now we have to go 65 feet." Monroe County: "From 1 to 3 miles from Lake Erie in dug wells, 12 to 15 feet in depth and 30 to 40 feet above the lake, a southwesterly wind lowers the water from 6 to 36 inches, and a northeasterly wind the reverse." "Sure that the water is lowering here every year." "Up to 4 or 5 years ago there were a large number of flowing wells; now there are none." Montcalm County: "The general water level has lowered about 1 foot." Newaygo County: "Cutting timber and clearing has not changed the water level in springs and wells." Roscommon County: "Most wells put down 35 years ago have had to be deepened 4 to 10 feet." Saginaw County: "Two flowing wells have quit flowing." Sanilac County: "Wells that first supplied the country with water were dug from 12 to 30 feet, but they are going dry, and the only way to get water is to drill in the rock." Tuscola County: "Wells had a depth of 12 to 40 feet 30 years ago, now are entirely dry." "Dug wells were used when country was new, but the water has given out; as the country becomes older the water supply becomes less." "Wells that were dug from 15 to 20 feet have given out, but our drilled wells never give out." Van Buren County: "Wells that were dug in early times are almost dry." "Springs have dried up some as the timber has been taken off." Wayne County: "Lowering ascribed to boring of salt wells and allowing the water to waste." Chippewa County: "A lake has lowered some 2 feet during recent years." Iron County: "Many springs have gone dry and deep wells have gone down about 9 to 10 feet." Menominee County: "The water has fallen in wells from 3 to 6 feet in the last 25 to 30 years; some good running springs have stopped." "As the timber has been cleared off the land the original dug wells and springs have usually dried up or nearly failed, so that there are hundreds of wells being drilled into the rock." "The average wells in this vicinity are lower 1 foot than in 20 years." Schoolcraft County: "The water in wells settled perhaps 1 foot"

Both the schedule records and the reporters' remarks (including the foregoing) for the lower and upper peninsulas of Michigan bring out significant relations between the state of water in the ground and time of settlement; the indications being clear that the water level subsides more rapidly, or at least the subsidence is better observed, during the decade or two immediately following settlement than during later decades. Doubtless closer attention is given to the water level by early settlers to whom the household well is of vital consequence than by later residents whose interests are more diversified; yet the difference in the records is wider than this fact alone would suggest. Thus, of the bi-state dug wells 66.1 per cent in upper Michigan and only 43.6 per cent in lower Michigan reveal change; while the mean difference between original water and present water

level in these wells is 3.7 feet in upper Michigan and only 1.6 feet in the lower peninsula. The mean rate of lowering of water in all wells in the upper peninsula is also about double that in the lower (though this figure is doubtless affected largely by physiographic conditions). The records and remarks for Michigan derive significance from the fact that in general the upper peninsula has been settled within a generation, while much of the lower peninsula has been occupied for two or three generations.

MINNESOTA.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Aitkin	*a*	5	1903	8	19.0	8	4.6	5	4.3	5			2	6.5	8	15.2
	b	1	1898	1	27	1	27	1	27	1					1	0
Anoka	*a*	5	1890	5	20.2	5	6.8	5	5.6	5			3	6	5	14.6
Becker	*a*	20	1900	22	28.9	18	6.3	22	4.7	18			9	38.5	22	24.2
	b	7	1904	7	119.4	7	39.7	7	39.7	7					7	79.7
Beltrami	*a*	12	1905	12	28.0	9	6.1	12	3.5	9			8	24	12	24.5
Benton	*a*	6	1893	6	23.2	6	6.3	6	4.2	6			4	13	6	19.0
	b	2	1901	2	116.5	2	82.5	2	82.5	2					2	34
Bigstone	*a*	2	1885	2	16	2	4.5	2	4.5	2					2	11.5
	b	7	1904	7	221.6	6	168.5	6	168.5	6					6	61.7
Blue Earth	*a*	5	1882	6	31	6	11.8	6	10	6			3	11	6	19.7
	b	8	1895	8	126.8	2	35	8	46.2	2					8	80.6
Brown	*a*	19	1887	19	37.9	17	10.1	19	7.0	8	2	4	13	66	19	30.9
	b	7	1894	7	170.	4	80	7	83.6	4					7	86.4
Carlton	*a*	11	1898	11	31.3	11	6.7	11	3.7	11			9	33	11	27.5
	b	1	1906	1	32.7	1	20	1	20	1					1	96
Carver	*a*	12	1885	12	32.8	12	10.6	12	2.0	12			12	103	12	30.9
	b	10	1897	10	155.2	8	72.2	8	69.7	8			1	20	8	84.2
Cass	*a*	9	1900	9	28.7	9	5.2	9	4.7	9			3	5	9	24
Chippewa	*a*	11	1882	11	27.7	11	11.1	11	6.3	11			10	53	11	21.5
	b	3	1908	3	108.7					0						
Chisago	*a*	11	1889	18	37.9	9	9.8	17	10.6	8			3	7	18	27.7
	b	6	1896	6	150	6	20.7	1	15	1					6	129.3
Clay	*a*	13	1900	13	40.3	13	11	13	8.6	13			11	31	13	31.7
	b	6	1907	9	148.1	6	131.2	9	119.7	6					9	28.4
Clearwater	*a*	4	1898	6	19.1	4	8.2	6	4.7	4			4	15.5	6	14.3
Cook	*a*	1	1899	1	7	1	5	1	4	1			1	1	1	3
Cottonwood	*a*	6	1891	6	41.7	6	21.8	6	11.8	6			4	60	6	29.8
	b	9	1897	10	141.1	8	85.9	8	83.4	8			2	20	8	45.5
Dakota	*a*	6	1869	6	31.8	6	5.1	6	2.6	6			5	15	6	29.2
	b	10	1893	11	104.4	10	29.2	11	33.3	10	3	22	1	5	11	71.1
Dodge	*a*	2	1902	2	23	2	16.5	2	16	2			1	1	2	7
	b	1	1897	1	154	1	120	1	120	1					1	34
Douglas	*a*	5	1890	5	42	5	10.4	5	8.8	5			4	8	5	33.2
	b	1	1890	1	115	1	90	1	90	1					1	25
Faribault	*a*	5	1890	5	52.6	4	33.5	5	29.2	4			1	2	5	23.4
	b	9	1890	11	105.9	9	62.7	11	58.5	9			2	20	11	47.4
Fillmore	*a*	2	1878	2	37	2	6.5	1	3	1					2	30.5
	b	1	1896	3	173.3	1	10	3	44.7	1			1	1	3	128.7
Freeborn	*a*	4	1894	4	20.2	4	7.1	4	5.5	4			4	6.5	4	14.7
	b	12	1898	14	167.4	10	125.8	10	125.8	10					10	39.4
Goodhue	*a*	3	1884	4	37.5	4	14.2	3	14.7	3			3	7	4	25
	b	8	1892	11	133.6	11	39.1	8	38.5	8			3	17	11	96.1
Grant	*a*	10	1893	10	64.2	8	40.2	10	23.2	7			6	156	10	41
	b	11	1896	11	102.6	8	43.7	11	30.3	8			3	62	11	72.4
Hennepin	*a*	7	1883	7	41.9	5	7.8	7	5.9	5			5	12.5	7	35.9
	b	12	1896	14	134.9	9	51.9	14	49	8			1	6	14	85.9
Houston	*b*	8	1892	12	227.2	12	60.9	8	73.6	7			1	24	12	168.2
Hubbard	*a*	12	1902	12	50.9	12	7.8	12	6.2	12			3	19	12	44.7
	b	1	1908	1	80	1	8	1	6	1			1	2	1	74
Isanti	*a*	5	1889	7	37.4	5	7.4	7	11.3	5			2	3	7	26.1
	b	1	1902	1	140	1	30	1	30	1					1	110
Itasca	*a*	10	1902	10	21.3	10	5.5	7	2.8	7			5	15.5	10	17.3
Jackson	*a*	3	1901	5	44.8	5	24.3	3	20.3	3			3	51.5	5	30.8
	b	5	1901	7	126.4	5	71	5	59.4	5			4	58	5	77.6
Kanabec	*a*	3	1905	3	42.3	3	7	3	4.3	3			3	8	3	38
Kandiyohi	*a*	9	1895	9	37.3	9	24.8	9	23.6	9	3	27	4	38	9	13.8
	b	5	1896	5	134.4	5	70	5	68	4			1	10	5	66.4
Kittson	*a*	8	1896	8	17	5	6	6	3.5	3			3	15	8	13.5
	b	4	1895	4	110.2	3	67.7	3	61	3			2	20	3	19.3
Koochiching	*a*	11	1907	11	11.5	11	4.3	7	1.9	7	1	1	5	16.5	11	8.6
	b	2	1908	2	156	1	60	1	60	1					1	52

MINNESOTA—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Lac qui Parle	a	20	1893	20	31.3	20	9.7	17	10.8	17	8	19.5	3	7	20	21
	b	4	1900	4	103.2	3	49.3	2	44	2					3	51.7
Lake	a	10	1907	10	15	10	4	10	3	10			10	10	10	12
Le Sueur	a	11	1892	11	24.9	11	9.6	10	1.7	10			9	89	11	23.4
	b	10	1903	12	189.6	11	85	5	99	5			2	70	11	82.7
Lincoln	a	4	1892	4	22.5	4	11.2	4	8.7	4	1	3	3	13	4	13.7
	b	5	1900	5	164.6	5	75	5	75	5					5	89.6
Lyon	a	15	1898	15	25.8	15	8.9	15	4.7	15			15	62	15	21.1
	b	6	1905	6	127	4	71	6	75.7	4			3	20	6	51.3
Mahnomen	a	3	1909	3	39	2	35	3	35	2					3	4
Marshall	a	12	1895	16	18.7	14	6.8	15	4.2	13			9	46.5	16	14.6
	b	8	1898	10	103.7	9	74.8	10	66.1	9			4	18	10	37.6
Martin	a			4	31.2	4	7	4	1.5	4			4	22	4	29.7
	b	4	1900	12	125.1	10	45.3	6	42.2	6			2	10	10	55.8
McLeod	a	8	1899	10	61	10	36.9	8	24.4	8			7	161	10	40.2
	b	6	1898	8	119.1	8	74.7	4	97	4			1	5	8	45
Meeker	a	9	1891	9	32.3	9	15.8	9	11.3	9			8	40	9	21
	b	3	1909	5	140.6	3	62.7	2	65	2					3	35
Millelacs	a	8	1897	11	24.7	11	7	8	2.9	8			6	26	11	20.1
	b	3	1909	4	69	4	27.5			0					4	41.5
Morrison	a	11	1892	12	35.1	11	5.9	12	3.7	11			9	30	12	31.3
	b	2	1904	4	93.7	3	34.7	3	10	2			2	65	4	80.2
Mower	a	3	1888	3	29.3	2	19.7	3	15.3	2			1	5	3	14
	b	12	1892	13	102.4	13	29	13	28.3	13			4	7.5	13	74.3
Murray	a	1	1899	1	40	1	20	1	20	1					1	20
	b	8	1898	8	150.1	8	106.2	8	101.2	8			3	40	8	48.9
Nicollet	a	4	1890	4	19	4	12	4	1	4			4	44	4	18
	b	6	1898	7	186	7	46.9	4	47	4					7	139.1
Nobles	a	20	1899	20	41.3	20	16.3	20	9.3	20			12	140.5	20	32
	b	6	1899	7	256.9	7	146.1	5	89	4			2	80	7	121.9
Norman	a	2	1899	2	15.5	2	7	2	3.5	2			2	7	2	12
	b	5	1904	5	88	5	86.8	5	86.8	5					5	1.2
Olmsted	a	4	1883	5	33	4	16.7	4	7.7	3			3	49	5	26.4
	b	6	1887	8	108.7	6	40.8	7	19	5			5	127	8	85.9
Ottertail	a	25	1892	28	34.4	28	7.7	26	6.6	26			20	32.5	28	27.8
	b	3	1904	4	150.2	4	47	2	10.5	2			1	4	4	129.2
Pine	a	3	1901	3	33.7	3	10.7	3	10.7	3					3	23
Pipestone	a	4	1905	7	39.6	7	21.7	6	22.2	6			3	15	7	20
	b	3	1903	5	98	5	39	3	30	3					5	59
Polk	a	17	1895	19	30.3	18	15.5	19	11.4	18	3	15	15	88.5	19	18.9
	b	11	1899	14	168.3	14	161.9	14	158.7	14			4	44	14	9.6
Pope	b	2	1901	2	80	2	36.5	2	36.5	2					2	43.5
Ramsey	a	2	1895	2	40	2	20.5	2	18.2	2			1	4.5	2	21.7
	b	2	1892	2	127	2	55	2	50	2			1	10	2	77
Red Lake	a	4	1893	7	23.4	7	11.4	7	4.4	7			6	49	7	19
	b	12	1904	13	107.6	9	91.7	9	79.7	6			3	18	12	19.5
Redwood	a	14	1900	14	44.1	14	20.9	14	18	14	1	2	9	42.5	14	26.2
	b	2	1903	2	72	2	30	2	7.5	2			2	45	2	64.5
Renville	a	8	1894	9	36.4	8	17	8	14.9	7	2	7	2	24	9	22.1
	b	2	1900	2	96	2	42.5	2	42.5	2					2	53.5
Rice	a	4	1882	4	37	4	12.7	4	7	4			3	23	4	30
	b	8	1903	8	150	8	70	6	60	6					8	80
Rock	a	3	1896	3	28.3	1	4	3	3.7	1			1	4	3	24.7
	b	6	1903	6	192.2	6	111.7	4	123.7	4			1	10	6	82.2
Roseau	a	6	1901	6	18.3	6	7.5	6	3.3	6			6	25	6	15
	b	3	1896	6	78.2	6	78.2	6	74.3	6			2	23	6	3.8
St. Louis	a	6	1907	7	18.6	7	5.8	6	3.7	6			5	16.5	7	15.1
	b			1	70	1	25			0					1	45
Scott	a	4	1881	4	32	4	10.5	4	7	4			2	14	4	25
	b	3	1894	3	140.2	3	65.7	3	30.5	3			2	45.5	3	89.5
Sherburne	a	16	1891	16	25.2	14	4.4	16	4.4	14			9	13.5	16	20.9
	b	1	1910	1	70			1	30	0					1	40
Sibley	a	9	1892	9	40	9	22.6	8	11.4	8	1	2	6	34	9	21
	b	8	1898	10	169.1	6	55.5	8	54.7	3					10	107.3
Stearns	a	15	1885	18	29.8	16	10.7	16	8.6	14			10	40	18	21.7
	b	3	1893	7	96.1	6	22.5	5	40.6	4			2	8	7	57.9
Steele	a	3	1878	3	28	3	12	3	4.7	3			3	22	3	23.3
	b	11	1896	11	145.2	8	97.4	11	98.5	8			1	10	11	46.7
Stevens	a	6	1894	8	24.1	4	5.2	8	6	4			3	6	8	18.1
	b	10	1899	11	114.3	10	65.1	10	62.5	9			5	46	11	47.5
Swift	a	4	1895	7	31	7	13.1	5	14.1	5			3	14	7	19.9
	b	2	1904	2	143.5	2	53.5	2	51.5	2			1	4	2	92
Todd	a	16	1900	20	26.2	20	6.6	18	3.1	18			15	70.5	20	23.2
	b	3	1905	3	110.3	3	81.7	3	80	3			1	5	3	30.3
Traverse	a	3	1894	3	45	1	40	3	18.3	1			1	20	3	26.7
	b	4	1894	4	124.7	4	97.5	4	97.5	4					4	27.2
Wabasha	a	1	1860	3	18.3	3	4.3			0					3	14
	b	6	1897	6	210.2	6	39.8	4	38.5	4					6	170.3

MINNESOTA—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Wadena	*a* 10	1893	12	17.8	11	3.7	10	2.4	9	....	.....	6	14	12	15.3
Waseca	*a*	.....	1	30	1	15	1	10	1	....	.....	1	5	1	20
	b 4	1893	6	108.2	6	44.5	5	33.4	5	....	.....	....	.....	6	63.7
Washington	*a* 3	1893	3	38	3	12	3	12	3	....	.....	....	.....	3	26
	b 6	1897	6	148.3	6	21	6	19.3	6	....	.....	4	10	6	129
Watonwan	*a* 2	1902	2	65	2	35	2	7	2	....	.....	2	56	2	58
	b 1	1902	1	128.5	1	110	1	50	1	....	.....	1	60	1	78.5
Wilkin	*b* 8	1904	16	147.4	15	151.3	16	145.6	13	1	2	1	2	16	1.7
Winona	*a*	.....	5	44.2	....	.....	5	11.4	0	....	.....	....	.....	5	32.8
	b 21	1895	23	302.9	21	52.7	20	54.2	17	....	.....	5	47	23	250.3
Wright	*a* 11	1888	11	37.6	10	16.8	11	16.3	10	....	.....	6	29	11	21.4
	b 13	1896	13	111.7	10	73.8	13	68.1	10	....	.....	1	5	13	43.6
Yellow Medicine	*a* 6	1893	6	32.8	6	17.8	6	17.5	6	....	.....	1	2	6	15.3
	b 5	1899	6	75	5	27.6	6	32.3	5	....	.....	1	4	6	42.7
Total	*a* 607	1894.2	677	31.9	620	11.5	632	8.4	565	22	80.5	400	2,264.5	677	23.5
	b 415	1898.2	492	144.7	418	71.4	407	69.6	348	4	24.0	99	1,108.0	469	75.0
Aggregate	1022	1895.8	1,169	.....	1,038	.....	1,039	.....	913	26	104.5	499	3,372.5	1,146	44.6

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Aitkin	3	3	6	....	....	....	9	Meeker	4	....	10	2	....	....	12
Anoka	2	1	4	....	....	....	5	Millelacs	6	1	10	4	....	....	15
Becker	10	3	12	7	7	....	29	Morrison	5	....	9	3	4	....	16
Beltrami	4	4	5	2	1	....	12	Mower	7	....	4	4	6	2	16
Benton	3	....	6	2	....	....	8	Murray	3	....	2	6	1	....	9
Bigstone	4	1	1	3	3	....	8	Nicollet	3	1	3	1	....	6	11
Blue Earth	5	....	6	1	6	1	14	Nobles	9	4	9	8	2	4	27
Brown	9	1	10	9	3	3	26	Norman	3	6	1	....	....	....	7
Carlton	5	....	6	5	1	....	12	Olmsted	5	1	2	6	2	2	13
Carver	7	1	7	7	2	3	20	Ottertail	12	....	16	13	1	2	32
Cass	3	2	3	4	....	....	9	Pine	1	....	3	....	....	....	3
Chippewa	4	2	7	2	....	....	11	Pipestone	4	3	2	5	2	....	12
Chisago	8	1	10	7	2	4	24	Polk	11	12	16	5	....	....	33
Clay	8	3	10	7	2	....	22	Pope	1	....	....	2	....	....	2
Clearwater	3	2	3	1	....	....	6	Ramsey	2	....	2	....	2	....	4
Cook	1	1	....	....	....	....	1	Red Lake	5	7	8	4	....	....	19
Cottonwood	5	1	5	5	3	....	14	Redwood	7	2	8	3	3	....	16
Dakota	6	....	4	7	4	2	17	Renville	4	....	9	1	1	....	11
Dodge	1	1	1	1	....	....	3	Rice	5	1	2	4	3	2	12
Douglas	2	1	2	2	1	....	6	Rock	3	....	3	2	1	3	9
Faribault	6	....	7	6	3	....	16	Roseau	4	8	4	....	....	....	12
Fillmore	2	....	1	2	1	1	5	St. Louis	3	2	5	1	....	....	8
Freeborn	7	2	5	6	1	....	14	Scott	3	....	4	1	1	1	7
Goodhue	5	....	5	6	1	3	15	Sherburne	6	....	16	1	....	....	17
Grant	7	1	3	7	10	....	21	Sibley	5	2	6	4	2	5	19
Hennepin	7	....	2	9	7	3	21	Stearns	9	3	11	9	2	....	25
Houston	5	1	....	4	....	7	12	Steele	6	1	5	5	2	1	14
Hubbard	4	....	7	1	3	2	13	Stevens	6	1	7	10	1	....	19
Isanti	3	....	6	1	....	1	8	Swift	3	....	7	1	....	1	9
Itasca	4	....	10	....	....	....	10	Todd	7	3	15	5	....	....	23
Jackson	4	....	3	2	4	1	10	Traverse	3	3	3	....	1	....	7
Kanabec	1	....	1	1	1	....	3	Wabasha	3	....	3	....	3	3	9
Kandiyohi	5	3	8	2	....	1	14	Wadena	4	3	8	1	....	....	12
Kittson	4	3	6	2	....	....	11	Waseca	3	....	1	3	3	....	7
Koochiching	4	7	4	1	....	....	12	Washington	3	....	2	1	2	4	9
Lac qui Parle	11	....	20	2	1	....	23	Watonwan	1	....	....	1	2	....	3
Lake	1	....	10	....	....	....	10	Wilkin	6	16	....	....	....	....	16
Le Sueur	7	2	7	5	5	3	22	Winona	9	....	4	2	1	21	28
Lincoln	4	2	3	....	1	3	9	Wright	9	1	12	7	4	....	24
Lyon	10	2	13	4	2	....	21	Yellow Medicine	6	1	6	4	1	....	12
Mahnomen	1	3	....	....	....	....	3								
Marshall	10	8	13	2	1	2	26	84 counties	414	146	488	279	136	97	1,146
Martin	5	1	4	6	3	....	14	Per cent	.....	12.7	42.6	24.3	11.9	8.5	.....
McLeod	5	1	4	9	4	....	18								

Reporters' remarks:

Becker County: "I do not find any wells that are affected by the dry season." "Droughts have no effect on water in the wells here." Beltrami County: "Many wells have been deepened." Benton County: "Open wells going dry." "Shallow wells gone entirely dry." Blue Earth County: "Very little change in wells 20 feet deep." Brown County: "Water has settled about 8 feet, except where there are springs." "Water failing in a good many wells." Carlton County: "Water in lakes is 3 feet higher than at some previous time." "Lots of wells gone dry." Carver County: "Dug or driven wells to depth of 35 to 40 feet have gone dry." "It is the shallow wells that are giving out." "The open wells, or those from 20 to 60 feet, are out of use." Cass County: "The lakes have lowered 3 to 5 feet." Chippewa County: "This country was settled 23 years ago; 95 per cent of the wells dug at that time have been abandoned for failure of supply; deeper wells are made." "Water in wells is a little lower than 28 years ago." Chisago County: "The severe drought has not changed the water strata in this locality." Clay County: "The dry weather is the cause of low water." "Water is now lower in wells on account of this dry season." Dakota County: "Water level has fallen about 70 feet." Douglas County: "Plenty of water in spite of the lakes being very low." Faribault County: "Water does not come near as fast as it used to." Freeborn County: "Shallow wells are all gone dry." Goodhue County: "All shallow wells are abandoned, also dug wells." Grant County: "Quite a few wells have gone dry; all dug wells are n. g." Isanti County: "Most wells deepened, some without result." Jackson County: "Wells deepened; one spring failed." Kandiyohi County: "About 30 years ago water was plenty in all wells; of late years many wells are short and new ones dug or bored, and it is a question of time when all will give out." "The general water level in wells is not so low as it was in about 1900, but we have never had the surface so dry as this season." Le Sueur County: "Shallow wells all dry." Lyon County: "About this time of the year the water seems to rise in the wells, even in years of great drought; I have attributed it to the lessening of evaporation." "Many wells failing." Millelacs County: "The water level has settled about 9 feet in the last 10 years; many dug wells have dried up in this time." "Wells even of 40 feet have had to be deepened." Morrison County: "Since 1882 the water table has lowered about 9 feet on the average; hundreds of wells and many springs have gone dry, and deep drilling has been resorted to." Mower County: "All shallow wells are giving out." "All wells which drew their supply from quite close to the surface—say from 15 to 25 feet—have long since been abandoned or made much deeper." Murray County: "Practically all dug wells have been abandoned." Nobles County: "Dug wells are nearly all dry." Olmsted County: "Springs and wells have not dried up so bad as in 1901 for the reason that the soil was full of water in the spring of 1910." Ottertail County: "Water level changes according to depth of lakes." "Wells dug about 1875 deepened in 1882; in all cases the first layer of gravel holding water gave out in a few years; the next water-holding stratum when struck sent the volume up to the bed that had been pumped dry; since then there has been no noticeable decrease." Pope County: "All the dug wells inadequate." "Drilled wells flow, but not so strong as at first." Rice County: "Even this exceedingly dry summer, the driest ever known here, affected wells little or none; a few, perhaps 25 per cent, of the springs that were here 50 years ago have dried up." Rock County: "The general water level is below what it was many years ago; excessive moisture for about the last 7 years has raised the water level in some of the shallow wells." Roseau County: "Flow from artesian wells diminishing or ceased." Sherburne County: "No change in water level in 35 years." "Many wells dried up." Steele County: "Most dug wells abandoned." Stevens County: "The water in these wells in 1900 was 1 foot lower than now." Todd County: "Many wells dry." "One artesian well ceased to flow; lakes lowered 4 to 6 feet." Wabasha County: "Dug wells all failed years ago." Wilkin County: "Ground water

level is 6 or 8 feet below that of 3 or 4 years ago." Winona County: "A well freezes up 90 feet down in winter." Wright County: "All wells deeper than the old open wells they have replaced." "All surface wells went dry this summer." Yellow Medicine County: "Surprised to note that in the continued drought the stage of water remains about the same as in former years."

By reason of the exceptionally dry summer of 1910 throughout Minnesota, special attention was directed to the relation between the water, the condition of lakes and streams, and the water level in wells; and while a good many reporters (including some of those quoted) ascribe the lowering of water level to the drought, a considerably larger number either give reasons for regarding the phenomena as independent or cite facts indicating that the lowering in water level has been in progress for years, and was not materially affected by the low rainfall during the summer of 1910. In the light of all the remarks (which are somewhat discordant, though each doubtless fairly represents a locality) and in view of general physiographic relations it may be assumed that the records for mean lowering of the ground level of water throughout Minnesota were slightly increased by the drought of 1910—though probably not to exceed a few hundredths of a foot.

MISSISSIPPI.

DELTA.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Bolivar	a	6	1898	30	45	10	29.7	30	29.2	10	....	.....	5	23	30	15.8
	b	1	1907	1	1,080	1	1,080	1	1,080	1	....	.....	....	.....	1	0
Coahoma	a		.....	2	32.5	....	.....	2	7.5	0	....	.....	....	.....	2	25
Issaquena	a	3	1903	3	23.7	3	8.3	3	0.5	3	....	.....	3	23.5	3	23.2
Leflore	a	5	1907	9	32.3	9	11.3	3	11.3	3	....	.....	....	.....	9	21
	b		.....	3	350	3	350	....	.....	0	....	.....	....	.....	3	0
Quitman	a	2	1895	2	45	2	17.5	....	.....	0	....	.....	....	.....	2	27.5
	b	1	1909	1	900	....	.....	....	.....	0	....	.....	....	.....	....	.....
Sharkey	a	7	1893	14	37.6	7	12.3	14	7.8	7	....	.....	5	31	14	29.8
	b	3	1909	5	639	5	639	2	650	2	....	.....	....	.....	5	0
Sunflower	a	8	1905	12	41.5	7	23.9	9	22.4	4	....	.....	....	.....	12	22.6
	b		.....	2	850	2	850	2	850	2	....	.....	....	.....	2	0
Tallahatchie	a	3	1904	4	30.7	3	15.3	4	17.5	3	1	2	1	2	4	13.2
	b		.....	1	450	1	450	1	450	1	....	.....	....	.....	1	0
Tunica	a		.....	7	40.7	2	30	7	22.9	2	....	.....	....	.....	7	17.9
Warren	a	4	1883	11	55.5	11	20.2	4	39.2	4	....	.....	1	4	11	35.7
Washington	a		.....	2	22.5	2	6.5	....	.....	0	....	.....	....	.....	2	16
	b	1	1904	1	815	1	775	....	.....	0	....	.....	....	.....	1	40
Yazoo	a	8	1885	16	36.5	8	9.6	16	7.4	8	....	.....	3	17	16	29.1
	b	2	1902	2	655	2	655	....	.....	0	....	.....	....	.....	2	0
Total	a	46	1896.3	112	40.5	64	17.7	92	19.0	44	1	2.0	18	100.5	112	23.1
	b	8	1906.4	16	656.2	15	637.3	6	755.0	6	0	0.0	0	0.0	15	2.7

MISSISSIPPI—Continued.

PINEHILL.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Alcorn	*a* 6	1875	6	48	4	5.2	6	5.2	4			2	5	6	42.8
	b 3	1893	3	103.3	2	45	3	41.7	2					3	61.7
Amite	*a* 11	1895	12	54.4	6	7.3	12	6.5	6	1	2	2	3	12	47.9
	b 2	1902	2	98	1	9	2	12	1					2	86
Attala	*a* 26	1881	28	51.1	18	9	27	7.2	17	1	3	5	8	28	42.9
	b 5	1901	5	177.6	5	137.6	4	140.7	4			1	5	5	41
Benton	*a* 4	1897	10	30.6	4	6	10	4.9	4			1	4	10	25.7
	b 2	1898	3	120	2	12.5	3	24	2			1	3	3	96
Calhoun	*a* 3	1896	6	31.3	4	6	6	5.3	4					6	26
Carroll	*a* 14	1890	16	54.6	12	4.1	16	6.7	12			3	7	16	47.8
	b		3	183.3	2	205	3	140	1					3	43.3
Chickasaw	*a* 3	1872	5	32.6	3	5.3	5	6.4	3					5	26.2
	b 3	1904	5	564	3	506.7	4	478.7	2			1	25	5	81
Choctaw	*a* 14	1892	16	54.2	16	6.9	16	5.6	16			8	20	16	48.6
Claiborne	*a* 3	1890	7	53.9	3	11.7	4	12	0					7	42
Clarke	*a* 6	1898	8	19.7	6	12.2	8	5	6			6	44	8	14.7
	b 3	1907	3	436.7	3	436.7	3	436.7	3					3	0
Clay	*a* 3	1882	3	22.7	3	4	3	4	3					3	18.7
	b 6	1877	8	581.2	8	437.2	8	435.2	8			3	16	8	146
Copiah	*a* 9	1893	10	46.9	10	8.7	10	7.4	10			4	13	10	39.5
De Soto	*a* 9	1885	11	38	11	7.2	10	6.3	10			5	13	11	32
	b		1	400	1	250			0					1	150
Forrest	*a* 9	1902	11	37	11	9.2	9	8.3	9			1	4	11	28.2
Franklin	*a* 15	1900	17	60.5	17	8.8	17	7.4	17	1	1	7	25	17	53.2
George	*a*		3	40			3	7	0					3	33
Grenada	*a* 1	1841	3	51.7	1	10	3	7	1					3	44.7
	b 2	1908	2	480	2	480			0					2	0
Hancock	*a* 8	1906	9	51.3	9	12.2	7	14.6	7					9	39.1
	b		1	400	1	400	1	400	1					1	0
Harrison	*a* 6	1874	6	23.5	6	8	6	8	6					6	15.5
	b		2	800	2	800	2	800	2					2	0
Hinds	*a* 16	1894	16	39.6	16	12.1	16	12.1	16					16	27.6
	b 1	1900	4	462.5	2	570	2	570	2					2	105
Holmes	*a* 8	1888	9	46.7	8	18.6	8	25.9	7	3	8	1	2	9	23.4
Itawamba	*a* 10	1891	10	48.6	7	12.4	7	11.1	4			4	6	10	39.6
Jackson	*a* 14	1896	17	22.8	11	7	13	5.9	7			1	6	17	17.4
	b		2	550	2	550	2	550	2					2	0
Jasper	*a* 11	1894	13	35.2	12	6.8	13	6.5	12	1	2	3	5	13	28.8
Jefferson	*a* 9	1895	9	65	5	5.2	6	8.5	2			1	3	9	57.1
Jefferson Davis	*a* 2	1899	3	93.3			3	42	0					3	51.3
Jones	*a* 5	1899	7	44.4	2	7	4	5.2	2					4	25.5
Kemper	*a* 9	1894	12	42.3	12	4.8	12	4.5	13	1	1	3	5	12	37.8
Lafayette	*a* 3	1887	9	30	7	5.9	9	5.3	7					9	24.7
	b		2	325	2	157.5	2	157.5	2					2	167.5
Lamar	*a* 5	1906	5	69.2	3	6.7	5	11.2	3					5	58
Lauderdale	*a* 6	1881	7	37.4	5	14.4	7	11.3	5			2	4	7	26.1
Lawrence	*a* 5	1900	5	50	2	5	5	6.4	2					5	43.6
	b 3	1901	3	100	3	17	3	16	3			1	3	3	84
Leake	*a* 8	1901	9	23.2	9	4.8	9	4.5	9			3	3	9	27.7
	b 1	1904	2	107.5	2	31	2	31	2					2	76.5
Lee	*a* 4	1882	5	32.6	5	12.8	5	8.1	5			2	23.5	5	24.5
	b 8	1890	11	258.2	11	172.3	11	172.3	11					11	85.9
Lincoln	*a* 7	1891	9	39	5	6.4	8	5.9	4					9	32.9
	b 5	1901	7	88.7	5	18.8	7	17.1	5			1	9	7	71.6
Lowndes	*a* 6	1892	6	21	6	3.5	3	2.7	3			1	1	6	17.7
	b 3	1898	5	377	5	326			0					5	51
Madison	*a* 13	1892	14	31.1	13	6.1	14	5.4	13			4	8	14	25.7
	b 1	1898	4	96.5	3	26.7	4	22	3					4	74.5
Marion	*a* 4	1886	7	46.4	7	6.4	4	6.2	4			1	3	7	40.4
	b 2	1895	3	176.8	3	83.5	2	2.5	2			2	5.5	3	95.2
Marshall	*a* 4	1903	5	43.2	5	5.4	5	5	5			1	2	5	38.2
	b 4	1901	4	111.2	4	20	4	20	4					4	91.2
Monroe	*a* 12	1885	15	28.7	14	5.4	12	4.8	11			7	12	15	24.3
	b		2	250	2	250			0					2	0
Montgomery	*a* 2	1907	2	52.5	1	10	2	6.5	1			1	2	2	46
	b 1	1909	1	100			1	12	0					1	88
Neshoba	*a* 6	1879	7	40.6	7	5.1	7	5	7			1	1	7	35.6
Newton	*a* 15	1878	15	32.5	12	4.9	15	4.2	12	1	1	4	8.5	15	28.3
Noxubee	*a* 3	1891	3	21.3	3	4	3	4	3					3	17.3
	b 4	1852	4	487.5	4	450.7			0					4	36.7
Oktibbeha	*a* 3	1880	4	62	3	3.7	4	3.2	3					4	58.7
	b 5	1900	7	702.1	7	657	7	651.3	7			3	40	7	50.9
Panola	*a* 9	1896	12	49.9	6	5.3	12	7.2	6			3	9	12	42.7
	b 1	1906	1	700	1	700	1	700	1					1	0
Pearl River	*a* 5	1903	5	40.4	2	4.5	5	5.4	2					5	35
Perry	*a* 9	1902	9	29.3	9	8.3	9	8	9			2	3	9	21.3
Pike	*a* 6	1899	6	79.8	6	12	6	7.2	6			2	29	6	72.7
	b 1	1845	1	185	1	25	1	7	0			1	18	1	178
Pontotoc	*a* 10	1891	10	46.5	6	3.5	10	6.4	6	1	1			10	40.1
	b 3	1906	4	263.5	3	235.7	4	214.2	3					4	49.2
Prentiss	*a* 10	1878	13	35.3	13	6.5	13	4.9	13			6	20.5	13	30.4
	b		3	115	3	71.7	3	71.7	3					3	43.3

MISSISSIPPI—Continued.

PINEHILL—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Rankin	*a* 14	1889	14	46	14	7.8	14	7.1	14	....	.....	4	9	14	38.9
Scott	*a* 7	1882	7	28.9	5	5	7	3.6	5	....	.....	2	7.5	7	25.2
Simpson	*a* 2	1875	6	38.5	6	6.6	2	4.7	2	....	.....	....	.....	6	31.9
	b 5	1899	5	89	3	7.3	5	10.4	3	....	.....	....	.....	5	78.6
Smith	*a* 12	1899	12	27.8	12	4.5	12	4.1	12	....	.....	3	5	12	23.7
Tate	*a* 2	1887	4	70	2	7.5	4	11.7	2	....	.....	....	.....	4	58.2
	b 1	1895	1	175	1	40	1	30	1	....	.....	1	10	1	145
Tippah	*a* 6	1876	10	41	10	7.8	10	6	10	....	.....	6	17	10	35
Tishomingo	*a* 8	1886	15	31.5	10	4.1	15	4.1	10	1	1	3	5	15	27.3
Union	*a* 10	1891	11	29.9	11	9.5	11	9.5	11	2	3	1	3	11	20.4
	b	.....	4	190	....	.....	4	176.2	0	....	.....	....	.....	4	13.7
Wayne	*a* 4	1900	4	42.5	4	3.7	4	3.7	4	....	.....	....	.....	4	38.7
Webster	*a*	.....	6	37.3	4	7.5	6	6.2	4	....	.....	2	11	6	31.2
	b 1	1900	1	250	1	250	1	250	1	....	.....	....	.....	1	0
Wilkinson	*a* 2	1899	4	48.7	2	5.5	4	5.5	2	....	.....	....	.....	4	43.2
Winston	*a* 5	1899	9	37.2	9	8.4	6	5.5	6	....	.....	1	1.5	9	29
	b 1	1908	2	180	2	37.5	1	60	1	....	.....	....	.....	2	142.5
Yalobusha	*a* 2	1894	2	45	2	6	2	4	2	....	.....	1	4	2	41
	b 1	1900	3	433.3	3	433.3	3	433.3	3	....	.....	....	.....	3	0
Total	*a*463	1886.1	569	41.6	457	7.4	529	7.1	421	13	23.0	120	365.5	566	34.4
	b 78	1895.2	124	308.9	105	263.9	104	226.3	86	0	0.0	15	134.5	122	67.8
State total	*a*509	1887.0	681	41.4	521	8.7	621	8.8	465	14	25.0	138	466.0	678	32.6
	b 86	1896.2	140	348.6	120	310.6	110	255.1	92	0	0.0	15	134.5	137	60.7
Aggregate	595	1888.3	821	.....	641	.....	731	.....	557	14	25.0	153	600.5	815	37.3

PROPORTIONATE DEPTHS—DELTA.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Bolivar	7	8	23	....	....	....	31	Warren	5	1	6	2	2	....	11
Coahoma	1	....	2	....	....	....	2	Washington	2	....	2	1	....	....	3
Issaquena	1	....	3	....	....	....	3	Yazoo	6	4	7	5	2	....	18
Leflore	3	4	6	2	....	....	12								
Quitman	1	....	1	1	....	....	2	12 counties	43	29	77	17	4	0	127
Sharkey	6	7	7	5	....	....	19	Per cent	....	22.8	60.6	13.4	3.2	....	....
Sunflower	6	2	11	1	....	....	14								
Tallahatchie	2	2	3	....	....	....	5								
Tunica	3	1	6	....	....	....	7								

PROPORTIONATE DEPTHS—PINEHILL.

Alcorn	3	....	3	3	3	....	9	Lincoln	7	....	4	7	5	....	16
Amite	5	....	1	9	4	....	14	Lowndes	3	2	6	....	3	....	11
Attala	11	4	10	10	9	....	33	Madison	6	....	11	2	5	....	18
Benton	4	....	7	3	3	....	13	Marion	3	2	1	4	1	2	10
Calhoun	3	....	6	....	....	....	6	Marshall	4	....	2	3	3	1	9
Carroll	6	2	4	8	4	1	19	Monroe	6	3	8	6	....	....	17
Chickasaw	5	....	6	2	1	1	10	Montgomery	1	....	....	2	1	....	3
Choctaw	6	....	1	12	3	....	16	Neshaba	3	....	4	2	1	....	7
Claiborne	3	....	3	2	2	....	7	Newton	6	....	9	6	....	....	15
Clarke	3	3	8	....	....	....	11	Noxubee	3	1	4	1	1	....	7
Clay	4	4	4	....	....	3	11	Oktibbeha	5	1	4	2	2	2	11
Capiah	4	....	5	3	1	1	10	Panola	5	1	3	8	1	....	13
Desoto	4	1	4	6	....	1	12	Pearl River	2	....	4	....	1	....	5
Forrest	4	1	6	4	....	....	11	Perry	3	....	8	1	....	....	9
Franklin	6	2	1	7	7	....	17	Pike	3	....	....	1	5	1	7
George	1	....	1	2	....	....	3	Pontotoc	5	....	7	4	2	1	14
Grenada	2	2	2	....	1	....	5	Prentiss	6	1	7	6	2	....	16
Hancock	3	3	2	3	2	....	10	Rankin	4	....	6	6	2	....	14
Harrison	3	3	5	....	....	....	8	Scott	3	....	6	....	1	....	7
Hinds	6	....	12	2	3	1	18	Simpson	4	....	3	4	4	....	11
Holmes	3	2	4	3	....	....	9	Smith	4	1	8	3	....	....	12
Itawamba	4	1	3	4	2	....	10	Tate	2	....	2	....	1	2	5
Jackson	6	6	11	2	....	....	19	Tippah	4	....	6	3	....	1	10
Jasper	5	....	10	2	1	....	13	Tishomingo	5	....	10	5	....	....	15
Jefferson	3	....	2	4	3	....	9	Union	4	3	11	1	....	....	15
Jefferson Davis	1	....	1	1	1	....	3	Wayne	2	....	2	2	....	....	4
Jones	3	....	3	1	....	....	4	Webster	3	1	5	....	1	....	7
Kemper	4	1	4	5	2	....	12	Wilkinson	3	....	1	2	1	....	4
Lafayette	4	....	7	1	1	2	11	Winston	5	....	6	2	2	1	11
Lamar	2	....	2	....	2	1	5	Yalobusha	2	3	....	2	....	....	5
Lauderdale	4	1	3	3	....	....	7								
Lawrence	3	....	....	5	3	....	8	64 counties	253	56	299	198	111	24	688
Leake	4	....	6	3	2	....	11	Per cent	....	8.1	43.5	28.8	16.1	3.5	....
Lee	5	1	4	3	6	2	16								

Reporters' remarks:

Attala County: "A mineral spring, a popular resort 30 to 50 years ago, failed about 1903." Carroll County: "Wells have become weak and springs have sunk and dried up because of the land being cleared." Lawrence County: "A few springs dried up—no new ones." "The general water supply is failing." Leake County: "A arge number of springs have disappeared owing to sand washing over them; two wells have dried up due to the drilling of deep-flowing wells." Monroe County: "Artesian flow is weaking." "A bold spring went dry; also a well had to be dug 24 feet deeper." Oktibbeha County: "Water is said to have sunk 20 feet within the past decade." Pearl River County: "The supply of water is abundant; the country is still covered with timber." Rankin County: "Springs are weakening." Tate County: "Wells and many springs dry; one spring started in an erosion gully." Tippah County: "Several springs have dried up and others are weaker on account of erosion of the soil and washing of gullies and the wanton destruction of the forests."

Although entirely within the Southern coast plain region, Mississippi comprises two physiographic districts, each fairly uniform throughout but widely distinct from the other—(1) the Delta and (2) the notably hilly territory of which a considerable part is known as "pine hills." The Delta comprises the bottom lands of the Mississippi, Yazoo, and other rivers, is largely subject to overflow, and the dates of putting down dug wells average some 10 years later than in the Pinehill region; in detail, the records for the two districts are dissimilar, though the averages are not widely divergent.

MISSOURI.

LOWLAND.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	Number.	Mean.	Number.	Mean.	Number.	Mean.	Number.	Mean.		Number.	Sum.	Number.	Sum.	Number.	Mean.
Butler	*a* 3	1900	8	30.4	7	7.9	8	6.6	7	....	.....	3	7.5	8	23.7
	b	.....	1	150	.....	.....	1	15	0	....	.....	....	.....	1	135
Dunklin	*a* 3	1905	12	17.1	.....	.....	12	7.5	0	....	.....	....	.....	12	9.6
Mississippi	*a*	.....	11	33.5	1	16	10	26.4	0	....	.....	....	.....	11	8.1
New Madrid	*a*	.....	9	20.2	.....	.....	9	9.2	0	....	.....	....	.....	9	11
Pemiscot	*a* 5	1902	7	19	5	8.8	7	9.6	5	....	.....	....	.....	7	9.4
Scott	*a* 5	1891	5	43.2	5	29	5	28.6	5	....	.....	1	2	5	14.6
Stoddard	*a* 17	1895	20	43.6	14	7.1	20	6.7	14	....	.....	4	24	20	36.9
Total	*a* 33	1896.6	72	30.8	32	11.3	71	11.7	31	0	0.0	8	33.5	72	19.0
	b 0	.....	1	150.0	0	.....	1	15.0	0	....	.....	....	.....	1	135.0

UPLAND.

Adair	*a* 22	1891	22	17.1	17	9.4	22	9.3	17	6	30	4	31	22	7.9
	b	.....	1	121	1	80	1	80	1	....	.....	....	.....	1	41
Andrew	*a* 1	1885	5	51	1	2	5	5.6	1	....	.....	....	.....	5	45.4
Atchison	*a* 8	1879	12	44	7	7.6	12	7.7	7	2	2	1	5	12	36.3
Audrain	*a* 7	1895	10	45.8	7	11	8	9.4	5	....	.....	....	.....	10	36.3
	b 11	1900	13	150.5	11	73.2	9	79.4	7	....	.....	....	.....	13	69.4
Barry	*a* 20	1884	22	43.2	19	11.3	21	10.3	18	3	4	1	1	22	32.9
	b 6	1902	8	173.7	7	63.6	7	93.6	6	....	.....	1	20	8	89.4
Barton	*a* 20	1886	23	24.5	23	12.6	23	10.9	23	6	20	10	60	23	13.7
	b 4	1897	4	98.7	4	72.5	4	54.5	4	1	15	2	87	4	44.2
Bates	*a* 12	1888	14	22.9	8	9.5	14	8.9	8	1	2	1	5	14	14.1
	b 3	1891	5	124.8	1	150	5	51	1	....	.....	....	.....	5	73.8
Benton	*a* 10	1879	12	31.1	10	11.9	12	10.1	10	3	3	3	8	12	21
	b 9	1892	12	127	9	74.7	12	73.9	9	1	5	....	.....	12	53.1

MISSOURI—Continued.

UPLAND—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	Number.	Mean.	Number.	Mean.	Number.	Mean.	Number.	Mean.		Number.	Sum.	Number.	Sum.	Number.	Mean.
Bollinger	*a* 9	1889	12	47.5	9	10.8	10	11.6	7	....	.....	2	4	12	37.8
	b 1	1904	1	90	1	40	1	40	1	....	.....	....	.....	1	50
Boone	*a* 1	1834	1	75	1	4	1	4	1	....	.....	....	.....	1	71
	b 1	1895	1	150	1	75	1	75	1	....	.....	....	.....	1	75
Buchanan	*a* 12	1868	22	42.1	14	13	22	10.4	14	1	1	4	15	22	31.7
	b 1	1896	1	380	1	280	1	280	1	....	.....	....	.....	1	100
Caldwell	*a* 20	1870	20	39.1	20	10.3	19	9.9	19	2	7	1	14	20	29.2
	b 1	1900	1	160	1	140	1	50	1	....	.....	1	90	1	110
Calloway	*a* 4	1884	9	16.8	5	6.4	9	6.6	5	4	9	....	.....	9	10.2
	b 3	1902	6	311.7	....	.....	1	100	0	....	.....	....	.....	1	50
Camden	*a* 2	1904	4	36	2	21	4	21.2	2	....	.....	1	2	4	14.7
	b 4	1904	8	80.7	5	24.4	8	23.4	5	1	1	3	11	8	57.4
Cape Girardeau	*a* 4	1879	8	30.7	4	10.5	8	7.5	4	....	.....	....	.....	8	23.2
	b 5	1902	5	96.2	5	17.6	5	17.6	5	....	.....	....	.....	5	78.6
Carroll	*a* 31	1884	40	32.9	36	12.9	40	12.5	36	9	26.5	8	43.5	40	20.4
	b	.....	2	118.5	....	.....	2	2.5	0	....	.....	....	.....	2	116
Carter	*a* 7	1891	9	22.7	8	9.2	9	8.7	8	2	2	2	6.5	9	13.9
	b 2	1900	2	126	2	101	2	100	2	....	.....	1	2	2	26
Cass	*a* 13	1877	18	29.2	18	10.4	13	9	13	1	5	8	31.5	18	20.2
	b 4	1906	4	74.2	4	30	4	28.5	4	....	.....	1	6	4	45.7
Cedar	*a* 5	1896	6	22	6	8.3	6	9	6	2	7	1	3	6	13
Chariton	*a* 23	1890	25	31.5	19	11.4	25	12	19	3	6	1	4	25	19.5
	b	.....	2	77.5	2	23	2	21	2	....	.....	2	4	2	56.5
Christian	*a* 6	1884	8	34.1	7	7.4	7	6.6	6	....	.....	3	6	8	26
	b 3	1902	3	117.7	3	45	3	43.3	3	....	.....	1	5	3	74.3
Clark	*a* 9	1898	12	36.2	9	12.2	12	10.7	9	1	0.5	1	5	12	25.5
Clay	*a* 14	1882	14	29.7	12	7	14	6.8	12	1	2	3	8.5	14	23
Clinton	*a* 3	1887	3	29	3	9.3	3	9.3	3	....	.....	....	.....	3	19.7
Cole	*b* 1	1909	2	121	2	70	2	70	2	....	.....	....	.....	2	51
Cooper	*b* 7	1905	7	102.1	5	46.8	7	47.3	5	2	22	1	30	7	54.9
Crawford	*a* 8	1894	8	28.4	8	9	8	7.7	8	....	.....	2	10	8	20.6
	b	.....	1	110	1	45	1	45	1	....	.....	....	.....	1	65
Dade	*a* 11	1890	11	29.6	11	14.3	11	14.4	11	1	1	....	.....	11	15.3
	b 1	1907	1	180	1	100	1	100	1	....	.....	....	.....	1	80
Dallas	*a* 10	1885	15	37.5	12	10.3	15	11.2	12	4	11	1	2	15	26.3
	b 3	1896	5	111.4	3	24.7	5	19	3	....	.....	1	4	5	92.4
Daviess	*a* 10	1878	14	28.6	10	7.1	14	7.9	10	....	.....	....	.....	14	20.6
	b 2	1903	3	130	2	80	3	66.7	2	....	.....	....	.....	3	63.3
Dekalb	*a* 10	1893	15	50.5	12	19.7	15	17.6	12	....	.....	1	3	15	32.9
Dent	*a* 2	1867	4	40.2	2	9	3	7.7	1	....	.....	....	.....	4	33.7
	b 1	1890	2	160	1	70	2	50	1	....	.....	....	.....	2	110
Douglas	*a* 12	1896	14	36.8	11	13.1	13	11.7	10	....	.....	1	2	14	24.6
	b 6	1909	8	112.5	6	23	8	22.1	6	....	.....	3	26	8	90.4
Franklin	*a* 6	1885	6	28.3	6	12.7	6	11.2	6	....	.....	2	9	6	17.2
	b 8	1900	10	126.5	7	53.6	10	49	7	....	.....	2	50	10	77.5
Gasconade	*a* 5	1878	5	42.8	5	20.6	3	16	3	....	.....	3	9	5	24
	b 5	1902	5	112	4	38.7	4	38.7	3	....	.....	....	.....	5	77
Gentry	*a* 3	1875	4	42.7	4	18	4	16	4	....	.....	1	8	4	26.7
Greene	*a* 14	1881	14	36.4	11	10.5	14	10.3	11	3	7	2	6	14	26.1
	b 13	1901	13	169.1	11	79.8	13	77.2	11	....	.....	1	7	13	91.8
Grundy	*a* 8	1882	14	19.8	8	9	14	5.9	8	....	.....	3	20	14	13.9
	b 4	1899	6	275.8	4	199.2	5	161.4	3	....	.....	....	.....	6	83
Harrison	*a* 15	1885	19	30.2	17	14	18	12.6	16	3	45	6	62	19	18.1
	b 4	1899	4	129.5	3	79.3	4	72	3	....	.....	....	.....	4	57.5
Henry	*a* 25	1881	31	29	22	9.1	26	11.3	17	4	15	1	2	31	17.9
	b 5	1893	6	114.2	4	54.5	6	41.3	4	....	.....	1	45	6	72.8
Hickory	*a* 9	1884	15	38.5	4	16	15	12.9	4	....	.....	1	18	15	25.6
Holt	*a* 12	1883	12	33.3	12	9.7	12	6.8	12	4	7	4	41.5	12	26.5
Howard	*a* 6	1855	6	49	3	10	6	10.5	3	....	.....	....	.....	6	38.5
Howell	*a* 4	1893	4	31.5	3	13	3	13	2	....	.....	....	.....	4	19.2
	b 5	1900	5	121.7	4	94.7	5	82.8	4	....	.....	....	.....	5	38.9
Jackson	*a* 1	1850	1	30	....	.....	1	10	0	....	.....	....	.....	1	20
Jasper	*a* 8	1866	8	30.5	5	4.9	8	7.8	5	....	.....	....	.....	8	22.7
	b 3	1905	3	167	1	50	3	125.7	1	....	.....	....	.....	3	41.3
Jefferson	*a* 9	1876	12	32.9	10	12.2	12	10	10	....	.....	3	12.5	12	23
	b 9	1901	14	144.9	10	66.7	14	99.3	10	....	.....	2	27	14	45.6
Johnson	*a* 9	1881	18	33.3	11	16.1	18	13.5	11	1	1	2	5	18	19.8
Knox	*a* 7	1886	7	20.7	7	12.3	7	12.6	7	1	2	....	.....	7	8.1
	b 2	1901	4	125.7	2	80	4	70	2	....	.....	....	.....	4	55.7
Laclede	*a* 5	1887	8	34.7	3	11.7	8	8.8	3	....	.....	....	.....	8	25.9
	b 7	1897	8	106	6	17.8	8	17.1	6	....	.....	....	.....	8	88.9
Lafayette	*a* 5	1898	6	31.1	3	11.7	6	10.2	3	....	.....	3	19	6	20.9
Lawrence	*a* 5	1882	5	38.4	5	7.2	5	10.4	5	4	16	....	.....	5	28
	b 1	1909	1	108	1	55	1	55	1	....	.....	....	.....	1	53
Lewis	*a* 10	1877	10	16.4	10	8.3	8	7.2	8	2	5	2	4.5	10	8
	b 2	1905	2	193	2	185	2	183	2	....	.....	1	4	2	110

MISSOURI—Continued.

UPLAND—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	Number.	Mean.	Number.	Mean.	Number.	Mean.	Number.	Mean.		Number.	Sum.	Number.	Sum.	Number.	Mean.
Lincoln	a 3	1889	13	20.5	2	6	13	6.8	2					13	13.3
	b 9	1904	10	244.2	4	155	9	177.7	3					10	66.3
Linn	a 4	1870	6	17.5	3	11	6	9.3	3					6	8.2
	b 5	1889	7	107.1	5	32.4	7	30.3	5					7	76.9
Livingston	a 3	1880	10	25.2	3	9	10	6	3			1	10	10	19.2
	b 8	1886	10	109.1	8	32.9	10	28.4	8			1	58.5	10	80.6
Macon	a 15	1894	17	29.3	15	11.5	16	15.9	14	8	75	2	8	17	13.7
Marion	a 1	1907	1	27			1	12	0					1	15
McDonald	a 7	1883	7	34.9	7	10	7	8.9	7	2	2.5	2	10	7	25.9
	b 1	1910	3	256	2	274	3	195	2			1	3	3	61
Mercer	a 6	1888	14	20.6	10	11.1	13	11	9					14	10.1
	b 1	1909	1	100	1	50			0					1	50
Miller	a 7	1878	12	40.6	7	16.1	12	11.2	7					12	29.4
	b 1	1885	2	85	1	80	2	50	1					2	35
Moniteau	a 4	1896	5	42	4	21.2	5	21	4					5	21
	b 5	1897	7	93.7	2	50	7	50	2			1	5	7	43.7
Monroe	b 6	1905	6	128.7	6	89.5	4	71.7	4					6	39.2
Montgomery	a 9	1864	12	32.5	8	13.7	12	11.4	8			1	2.5	12	21.1
	b 8	1903	10	218.9	6	83.5	10	119.6	6					10	99.3
Morgan	a 1	1900	1	36.5	1	20	1	20	1					1	16.5
	b 2	1904	2	85	2	15	2	15	2					2	70
Newton	a 31	1880	35	38.6	32	7	33	6.4	30			11	37	35	32.4
	b 7	1902	11	129.2	9	65.4	11	67.2	9	1	10	2	15	11	62
Nodaway	a 6	1885	13	35	13	12.1	13	9.9	13			8	30	13	25.1
Oregon	a 8	1869	10	19.5	10	4	10	2.7	10			6	13	10	16.8
	b 2	1900	2	154.5	2	37.5	2	37.5	2					2	117
Osage	a 2	1885	3	26.7	2	6	1	5	0					3	21
	b 3	1903	3	84	3	37.3	3	37.3	3					3	46.7
Ozark	a 6	1882	6	34.7	4	4.2	6	5.2	4					6	29.5
	b 3	1895	3	89	3	32.7	3	33.3	3	1	2			3	55.7
Perry	a 3	1885	3	24	3	6	3	4.7	3			1	4	3	19.3
	b 3	1895	3	188.7	3	56.7	3	56.7	3					3	132
Pettis	a		1	50			1	5	0					1	45
	b 2	1892	4	150	1	120	4	90.5	1			1	30	4	59.5
Phelps	a 2	1879	2	40	2	15	2	15	2					2	25
	b 7	1902	8	106.4	8	32	8	30.5	8			2	12	8	75.9
Pike	a 4	1886	8	25.4	1	15	8	10.5	1					8	14.9
Platte	a 1	1870	3	53.3	1	17	3	10.7	1					3	42.7
Polk	a 1	1872	4	30.2	1	6	4	10.7	1			1	2	4	19.5
	b 5	1888	6	93.3	5	32	6	39.2	5					6	54.2
Pulaski	a 2	1903	7	23.9	2	8	7	7.7	2					7	16.1
	b 6	1899	13	111.2	7	19.4	13	19.9	7					13	91.2
Putnam	a 5	1890	5	25	5	8.8	5	6.4	5	1	3	4	15	5	18.6
	b 1	1905	1	80	1	25	1	20	1			1	5	1	60
Ralls	a 1	1898	3	30.7	3	8.7	3	8.7	3					3	22
	b 5	1905	5	201.8	5	121	5	121	5					5	80.8
Randolph	a 5	1856	5	44.8	5	24	5	24	5					5	20.8
Ray	a 15	1884	20	34.9	14	12.2	20	11.6	14			2	5	20	23.2
Reynolds	b 3	1893	8	29	3	8.2	8	7.4	3			1	0.5	8	21.6
Ripley	a 9	1882	11	26.7	9	10.1	11	7.6	9	4	21	5	41	11	19.1
	b		1	125			1	40	0					1	85
St. Charles	a 8	1876	8	32.7	6	6.4	8	7	6	3	5.5			8	25.7
	b 1	1904	1	290			1	180	0					1	110
St. Clair	a 10	1881	15	31.5	12	14.8	15	13.1	12	1	2	4	12	15	18.4
	b 5	1898	5	71	5	35.2	5	35.2	5					5	35.8
St. Genevieve	a		2	22.5			2	17.5	0					2	5
	b		1	300			1	256	0					1	44
St. Francois	a 6	1891	7	23.3	4	5.7	7	5.4	4					7	17.9
	b 4	1903	4	116.7	3	29	4	46.7	3					4	70
St. Louis	a 10	1868	10	27.6	9	11.1	10	11.3	9	2	3	2	5	10	16.3
	b 5	1903	5	144.4	5	72.6			0					5	71.8
Saline	a 6	1874	6	50	6	23.7	6	23.3	6			1	2	6	26.7
	b 8	1905	12	177.6	11	111.8	9	96.7	8					12	71.7
Schuyler	a 6	1874	6	22	6	8	6	9	6	3	6			6	13
Scotland	a 12	1884	12	24.7	12	12.8	12	12.8	12	2	2	1	2	12	11.8
	b 1	1910	1	160	1	40	1	40	1					1	120
Shannon	a 3	1892	4	38.7	4	13.2	4	10.5	4			2	11	4	28.2
	b 3	1908	3	374.7	3	191.7	3	191.7	3					3	183
Shelby	a 4	1878	4	20.7	4	8.2	4	4.5	4			1	15	4	16.2
	b 10	1896	10	157.2	8	96.2	10	88.2	8	1	10			10	69
Stone	a 2	1868	4	31.2	2	12.5	4	12	2					4	19.2
	b 6	1902	6	57.2	6	17.2	6	16.3	6			1	5	6	40.8
Sullivan	a 10	1894	11	22.5	9	15.6	11	13.5	9	4	7	2	14	11	9
	b 1	1903	1	145	1	15	1	15	1					1	130
Taney	a 8	1899	9	24.8	9	9.9	8	10.5	8			2	2	9	15.1
	b 8	1905	9	93.2	8	18.5	9	18.1	8			3	20	9	75.1

MISSOURI—Continued.

UPLAND—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	Number.	Mean.	Number.	Mean.	Number.	Mean.	Number.	Mean.		Number.	Sum.	Number.	Sum.	Number.	Mean.
Texas	*a* 6	1889	7	24.5	6	7.7	7	7.1	6	1	1	1	3	7	17.4
	b 8	1900	8	89.4	6	21.2	8	24.5	6	1	2	2	3	8	64.9
Vernon	*a* 18	1887	22	26.8	16	8.3	21	8.2	15	1	0.5	5	21	22	18.6
Warren	*a* 2	1905	4	17	2	10.7	4	8.4	2	....	.....	....	.....	4	8.6
	b 2	1880	2	86.5	1	18	2	21.5	1	....	.....	....	.....	2	65
Washington	*a* 3	1904	5	27.2	5	13.4	5	14.6	5	3	6	....	.....	5	12.6
	b 2	1902	2	100	.....	.....	2	75	0	....	.....	....	.....	2	25
Wayne	*a* 8	1891	19	29.7	10	10.5	19	7.8	10	....	.....	5	25	19	21.8
	b 1	1904	2	72.5	.....	.....	2	32.5	0	....	.....	....	.....	2	40
Webster	*a* 10	1882	17	28.2	7	9.3	17	7.9	7	1	2	3	15	17	20.3
	b 3	1901	6	61.7	4	26.2	6	19.7	4	....	.....	1	24	6	42
Worth	*a* 6	1894	9	27.8	6	12.5	9	13	6	....	.....	3	10	9	14.8
Wright	*a* 15	1897	20	35.1	17	14.7	20	14.3	17	1	1	1	1	20	20.8
	b	.....	4	90	1	40	4	35	1	....	.....	....	.....	4	55
Total	*a*806	1883.6	1,055	31.7	799	11.2	1,022	10.4	748	111	374.5	170	802.0	1,055	21.3
	*b*308	1900.0	399	134.8	288	63.1	373	62.0	269	9	62.0	40	599.0	392	69.0
State total	*a*839	1884.1	1,127	31.6	831	11.2	1,093	10.4	779	111	374.5	178	835.5	1,127	21.2
	*b*308	1900.0	400	134.9	288	63.1	374	61.9	269	9	62.0	40	599.9	393	69.2
Aggregate	1,147	1888.4	1,527	.....	1,119	.....	1,467	.....	1,048	120	436.5	218	1,434.5	1,520	33.6

PROPORTIONATE DEPTHS—LOWLAND.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Butler	3	1	5	2	.....	1	9	Scott	3	1	4	.....	.....	....	5
Dunklin	6	6	6	.....	.....	....	12	Stoddard	8	1	5	13	1	....	20
Mississippi	4	6	5	.....	.....	....	11								
New Madrid	4	3	6	.....	.....	....	9	7 counties	31	21	35	15	1	1	73
Pemiscot	3	3	4	.....	.....	....	7	Per cent	....	28.8	47.9	20.5	1.4	1.4	.....

PROPORTIONATE DEPTHS—UPLAND.

Adair	8	15	7	1	.....	....	23	Douglas	9	2	8	7	2	3	22
Andrew	2	1	1	1	2	....	5	Franklin	6	2	4	6	2	2	16
Atchison	4	1	5	4	2	....	12	Gasconade	4	.....	4	2	3	1	10
Audrain	7	.....	6	11	3	3	23	Gentry	2	.....	4	.....	.....	....	4
Barry	11	2	7	12	7	2	30	Greene	8	3	11	5	3	5	27
Barton	9	7	16	3	1	....	27	Grundy	5	3	12	1	3	1	20
Bates	7	3	13	1	1	1	19	Harrison	8	4	13	5	1	....	23
Benton	9	3	12	4	4	1	24	Henry	13	8	19	5	5	....	37
Bollinger	5	1	5	5	1	1	13	Hickory	5	.....	13	1	1	....	15
Boone	2	.....	.....	.....	2	....	2	Holt	5	2	8	1	1	....	12
Buchanan	9	1	13	5	4	....	23	Howard	2	.....	3	1	2	....	6
Caldwell	7	1	12	7	.....	1	21	Howell	3	1	3	5	.....	....	9
Calloway	7	5	4	1	.....	....	10	Jackson	1	.....	1	.....	.....	....	1
Camden	4	1	3	6	2	....	12	Jasper	4	3	3	4	1	....	11
Cape Girardeau	4	1	5	3	4	....	13	Jefferson	8	3	8	11	4	....	26
								Johnson	5	6	8	3	1	....	18
Carroll	12	9	24	6	2	1	42	Knox	3	5	2	3	1	....	11
Carter	4	4	5	2	.....	....	11	Laclede	5	.....	6	3	5	2	16
Cass	7	3	12	6	1	....	22	Lafayette	2	2	2	2	.....	....	6
Cedar	2	2	4	.....	.....	....	6	Lawrence	2	.....	3	3	.....	....	6
Charlton	9	4	16	6	1	....	27	Lewis	4	7	3	.....	.....	2	12
Christian	4	2	2	3	4	....	11	Lincoln	6	9	5	5	2	2	23
Clark	5	2	5	5	.....	....	12	Linn	4	4	2	4	1	2	13
Clay	6	.....	10	4	.....	....	14	Livingston	8	1	8	2	8	1	20
Clinton	1	.....	3	.....	.....	....	3	Macon	7	7	8	2	.....	....	17
Cole	1	.....	.....	1	1	....	2	Marion	1	.....	1	.....	.....	....	1
Cooper	3	.....	2	3	1	1	7	McDonald	3	1	5	2	2	....	10
Crawford	5	3	3	2	1	....	9	Mercer	6	8	5	2	.....	....	15
Dade	4	1	10	.....	1	....	12	Miller	6	1	9	3	.....	1	14
Dallas	8	.....	10	5	4	1	20	Moniteau	3	1	6	4	.....	1	12
Daviess	7	4	8	3	2	....	17	Monroe	2	1	2	2	1	....	6
Dekalb	5	1	8	3	3	....	15	Montgomery	8	2	10	3	3	4	22
Dent	2	1	2	.....	1	2	6	Morgan	1	.....	1	.....	2	....	3

MISSOURI—Continued.

PROPORTIONATE DEPTHS—UPLAND—Continued.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Newton	14	2	19	15	10	....	46	St. Louis	6	2	8	1	4	....	15
Nodaway	4	....	10	3	....	....	13	Saline	6	....	7	7	2	2	18
Oregon	5	2	8	....	1	1	12	Schuyler	2	3	3	....	....	....	6
Osage	3	....	4	2	....	....	6	Scotland	5	5	7	....	....	1	13
Ozark	3	....	4	4	1	....	9	Shannon	4	....	3	1	....	3	7
Perry	2	1	1	1	1	2	6	Shelby	6	2	2	4	5	1	14
Pettis	1	....	1	3	1	....	5	Stone	3	1	3	5	1	....	10
Phelps	4	....	3	1	4	2	10	Sullivan	4	8	3	....	....	1	12
Pike	4	1	7	....	....	....	8	Taney	7	4	5	3	5	1	18
Platte	2	....	2	....	1	....	3	Texas	6	1	7	3	4	....	15
Polk	5	....	4	4	2	....	10	Vernon	8	1	20	1	....	....	22
Pulaski	6	2	6	3	6	3	20	Warren	2	3	1	1	1	....	6
Putnam	2	....	5	1	....	....	6	Washington	3	2	4	1	....	....	7
Ralls	3	....	2	4	1	1	8	Wayne	9	1	15	5	....	....	21
Randolph	2	1	3	1	....	....	5	Webster	9	2	15	5	1	....	23
Ray	7	3	11	6	....	....	20	Worth	3	3	4	2	....	....	9
Reynolds	3	....	6	2	....	....	8	Wright	7	4	14	6	....	....	24
Ripley	4	1	9	1	1	....	12								
St. Charles	3	2	4	2	....	1	9	104 counties	520	228	681	315	162	61	1,447
St. Clair	7	4	11	5	....	....	20	Per cent	....	15.8	47.0	21.8	11.2	4.2	....
St. Genevieve	1	2	....	1	....	....	3								
St. Francis	6	1	7	1	1	1	11								

Reporters' remarks:

Adair County: "Some wells have gone dry, while others gain; two springs have failed entirely; we have to go 20 feet farther for water than we did 30 years ago; more than a dozen wells have been abandoned in the last 30 years." "The rise of water to the surface is caused by more rainfall in this timbered section." Boone County: "Springs are not quite as strong as 30 or 40 years ago." Buchanan County: "We have to go deeper by 25 or 30 feet to get lasting water than in 1880." "Water is perhaps 5 feet lower than when the country was first settled, caused by cutting down our forest." "Water not as plentiful as before the timberland was all cleared." Carroll County: "I notice very distinctly since the settling and cultivation of the country as a whole the water supply is not as abundant as in former years; the older a country is, the less the water supply." "The ground-water level is apparently rising; seven years ago a small spring started and has been slowly increasing in volume ever since." Cedar County: "The water in wells the last five years has been 3 to 5 feet higher than 10 years before." Dallas County: "Several good and never-failing springs have appeared in the last 25 or 30 years." Daviess County: "The earthquake in 1860 raised the water, water broke into the cisterns and some springs burst out." "Springs have broken out on farms where 40 years ago there was no water." "The spring giving name to this town (Lockspring) ceased to flow 30 years ago." Dekalb County: "No decrease in water supply of wells 20 or more feet deep in 30 years, but in shallow dug wells the water has decreased 4 to 6 feet, due to cultivation of soil and removal of grass." Douglas County: "Springs are getting stronger." Harrison County: "The wells are increasing in volume of water each year." Holt County: "The water level has been steadily sinking since cultivation began. Knox County: "All wells are stronger now than when first dug." Lawrence County: "Wells get stronger as they get older; since fencing and closer pasturing many springs have developed." Lewis County: "A spring broke out a few years ago and is still furnishing a good supply." Livingston County: "A spring now flows a big volume of water, five times what it did during the Civil War." Macon County: "A well dug in 1902; no water; in 1909 water broke in, and now waters all the owner's stock." Newton County: "Springs generally weakened." Ozark County: "Two springs broke out, one in 1902, the second in 1907." Platte County: "Springs are not so active as they were when the country was new 50 years ago." Saline County: "Sixty years ago we found water at 15 feet, now 100 feet." Schuyler County: "The wells grow stronger with age." "Old wells stand in depth of water as when dug." Shannon County: "Springs have started in

several places in the last few years, and water stands in ponds in valleys where a few years ago it would sink away." Shelby County: "A well seemed to be inexhaustible until another was put down a mile away, when it went dry." Stone County: "In the last 30 years there are 5 to 1 more springs." Taney County: "A spring made itself some five years ago." "Some wells seem to have failed to some extent, while springs seem to have increased in number and in quantity of water." Texas County: "Two springs have come in the last 10 years." Vernon County: "The gradual failing of wells is caused by the packing of the soil and beating of the roadways, causing the water to run off quickly, instead of storing itself in the rocks as it did years ago."

While the foregoing remarks (and others of like import not quoted) are more or less discordant, they are strikingly consistent with the records for the different stations throughout the State. Of the 1,017 bi-state wells of Upland Missouri, less than a third (32.4 per cent) show changes in level; and of these 120 have risen and only 210 lowered, the minimum average lowering of the subsoil water level in over 20 years being but 0.433 foot. In the course of the reduction of the data Missouri was taken up after Minnesota and Iowa, and both the records and remarks were so unlike those of the neighboring States as to awaken the apprehension that some systematic error pervaded the entire series. Indeed it was not until the tabulation approached completion that the facts for Missouri were found to fall into a broader harmony than was foreseen, throwing a totally unexpected light on the unity in substance and movement of the subsoil water body.

MONTANA.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Carbon	*a* 3	1903	3	24	3	7.3	3	9	3	2	5	....	.....	3	15
Custer	*b* 1	1892	3	272.7	2	270	3	190	2	....	.....	....	.....	3	82.7
Fergus	*a* 1	1905	2	32.5	1	2	2	2.5	1	....	.....	....	.....	2	30
	b	.....	1	120	....	.....	1	20	0	....	.....	....	.....	1	100
Flathead	*a* 1	1894	1	16	....	.....	1	1	0	....	.....	....	.....	1	15
Gallatin	*a* 4	1894	6	41.5	3	4	3	8.2	0	....	.....	....	.....	6	35.4
	b	.....	1	150	....	.....	1	25	0	....	.....	....	.....	1	125
Madison	*b* 3	1889	3	175	....	.....	3	16.7	0	....	.....	....	.....	3	158.3
Meagher	*a* 3	1909	3	8.3	3	3.7	3	3.7	3	....	.....	....	.....	3	4.7
Missoula	*a* 6	1900	6	43.2	5	4.6	6	4.8	5	1	1	....	.....	6	38.3
Ravalli	*a* 3	1885	3	12	3	3	3	3	3	....	.....	....	.....	3	9
Sanders	*a* 2	1887	2	18	2	11.5	1	5	1	....	.....	....	.....	2	6.5
Yellowstone	*a* 3	1893	3	21	3	3.7	3	2.7	3	....	.....	3	3	3	18.3
	b 3	1909	3	310	3	303.3	3	303.3	3	....	.....	....	.....	3	6.7
Total	*a* 26	1896.6	29	28.3	23	4.9	25	4.8	19	3	6.0	3	3.0	29	23.2
	b 7	1897.9	11	231.2	5	290.0	11	143.2	5	0	0.0	0	0.0	11	88.0
Aggregate	33	1897.1	40	.....	28	.....	36	.....	24	3	6.0	3	3.0	40	44.0

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Carbon	1	1	2	....	....	....	3	Ravalli	1	3	....	....	....	....	3
Custer	1	1	....	....	....	2	3	Sanders	1	1	1	....	....	....	2
Fergus	1	....	1	1	1	....	3	Yellowstone	2	2	4	....	....	....	6
Flathead	1	....	1	....	....	....	1								
Gallatin	3	1	2	2	1	1	7	11 counties	15	12	15	4	3	6	40
Madison	1	....	....	....	....	3	3	Per cent	....	30.0	37.5	10.0	7.5	15.0	....
Meagher	1	3	....	....	....	....	3								
Missoula	2	....	4	1	1	....	6								

Reporters' remarks:

Carbon County: "Rise in water due to irrigation of ground immediately adjacent." Flathead County: "The people will bless you for making this investigation." Gallatin County: "Wells full during irrigating season; other seasons 20 feet to water."

As in the Cordilleran States generally, nearly all the wells reported are in valleys within which irrigation is practiced; and the remarks of the reporters relative to the effect of irrigation on the ground level of water are in agreement with the figures recorded in the schedules.

NEBRASKA.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Adams	*a*	.....	3	21.7	1	12	3	8.3	1	....	.....	....	.....	3	13.3
	b 15	1897	22	114.6	16	31.1	22	26.6	16	1	5	1	20	22	88
Antelope	*a* 4	1899	4	40.5	4	14.7	4	14.5	4	....	.....	1	1	4	26
	b 3	1898	3	93	....	.....	3	21.7	0	....	.....	....	.....	3	71.3
Banner	*b* 2	1889	2	187.5	2	5	2	3	2	....	.....	2	4	2	184.5
Blaine	*b* 5	1904	5	154.2	5	65.2	4	56.5	4	....	.....	....	.....	5	89
Boone	*b* 12	1892	13	135	12	55.9	13	52.8	12	....	.....	....	.....	13	82.2
Boxbutte	*a* 1	1888	1	40	1	12	1	12	1	....	.....	....	.....	1	28
Boyd	*a* 8	1900	8	34.9	8	10.5	8	10.1	8	....	.....	1	3	8	24.7
Brown	*b* 4	1903	6	151.7	6	76.2	4	106	4	....	.....	....	.....	6	75.5
Buffalo	*a* 5	1889	11	37.5	8	12.1	7	10.6	4	....	.....	....	.....	11	24.7
	b	.....	4	180	....	.....	4	50	0	....	.....	....	.....	4	130
Burt	*a* 8	1888	8	57.6	8	10.6	8	13.1	8	4	27	3	7	8	44.5
	b 1	1904	5	222	1	90	5	110	1	....	.....	....	.....	5	112
Butler	*a* 21	1892	22	51.9	21	20.8	21	23	20	6	44.5	3	7.5	22	29
Cass	*a* 6	1880	6	34.3	5	9.8	6	11.5	5	1	8	1	8	6	22.8
	b 6	1899	6	113.8	6	69.2	4	66.2	4	2	10	....	.....	6	43
Cedar	*a* 10	1887	14	33.9	8	10.9	14	8.5	8	....	.....	2	10	14	25.5
	b 1	1896	9	269.7	3	541.7	9	211.7	3	....	.....	....	.....	9	58
Chase	*a* 2	1886	3	50.7	3	17.3	3	17.3	3	....	.....	....	.....	3	33.3
	b 1	1907	5	213	5	37	5	37	5	....	.....	....	.....	5	176
Cherry	*a* 5	1898	6	42.1	5	13.5	4	8.9	3	....	.....	1	2	6	30.8
	b 11	1902	11	129.7	11	78.4	7	58	7	....	.....	2	6	11	51.9
Cheyenne	*a* 1	1900	1	60	1	2.5	1	2.5	1	....	.....	....	.....	1	57.5
	b 8	1898	8	226.6	8	35.6	8	35.5	8	....	.....	1	0.5	8	191.1
Clay	*a* 2	1887	6	67.5	3	13.3	6	10.3	3	....	.....	....	.....	6	57.2
	b 9	1891	11	113.6	7	25.6	11	24.3	7	....	.....	2	7	11	89.4
Colfax	*a* 5	1894	5	30.2	4	5.5	5	10.8	4	4	12	....	.....	5	19.4
	b 7	1905	8	190.6	5	79.8	7	63.7	4	....	.....	....	.....	8	122.4
Cuming	*a*	.....	3	27.7	....	.....	3	8.3	0	....	.....	....	.....	3	19.3
	b	.....	4	118.7	3	24	4	29.2	3	....	.....	....	.....	4	89.5
Custer	*a* 5	1886	6	44.8	5	15.6	6	13.3	5	....	.....	....	.....	6	31.5
	b 23	1899	28	184.1	18	83.9	28	76.1	18	....	.....	1	5	28	108.1
Dakota	*a* 3	1877	3	25	3	22.3	3	22.7	3	1	1	....	.....	3	2.3
Dawes	*a* 3	1898	4	36.2	3	11.7	3	12.3	2	1	2	....	.....	4	25.7
	b 4	1902	4	89.7	4	19	4	19.5	4	1	2	....	.....	4	70.2
Dawson	*a* 1	1899	3	26.3	1	18	3	13.7	1	1	8	....	.....	3	12.7
	b 17	1901	17	220.9	12	47.6	17	48.6	12	2	11	....	.....	17	172.3
Deuel	*b* 3	1895	3	170	3	11.3	3	11.3	3	....	.....	....	.....	3	158.7
Dixon	*a* 16	1896	21	42.6	18	13.2	21	12.3	18	2	2	6	16.5	21	30.4
	b	.....	1	380	1	380	1	380	1	....	.....	....	.....	1	0
Dodge	*a* 7	1887	10	39.3	8	17.9	9	16.8	7	3	9	....	.....	10	22.7
	b 6	1893	7	163.4	5	60.2	7	82.7	5	....	.....	....	.....	7	80.7
Douglas	*a* 3	1898	5	41.4	2	9	5	12.6	2	2	3	....	.....	5	28.8
	b 1	1902	1	212	1	40	1	40	1	....	.....	....	.....	1	172
Dundy	*a* 3	1898	3	31.7	3	9.7	3	10.8	3	1	3.5	....	.....	3	20.8
	b 1	1885	1	280	1	14	1	14	1	....	.....	....	.....	1	266
Fillmore	*a* 10	1890	13	68.2	10	17.4	13	15.5	10	....	.....	2	9	13	52.7
	b 15	1894	18	115.4	15	48.3	18	43.9	15	2	6	....	.....	18	71.5
Franklin	*a* 12	1900	13	33.1	12	9.6	13	8.8	12	....	.....	3	9	13	24.3
	b 5	1899	5	167.6	5	9.3	5	8.9	5	....	.....	1	2	5	158.7
Frontier	*a* 1	1885	3	47.3	3	6.7	3	6.7	3	....	.....	....	.....	3	40.7
	b 15	1898	19	191.6	15	20.8	19	20.8	15	1	2	1	1	19	170.8
Furnas	*a* 2	1887	2	35	2	22.5	2	10	2	....	.....	1	25	2	25
	b 10	1890	13	170.4	10	20.9	13	19.9	10	....	.....	....	.....	13	150.5
Gage	*a* 21	1885	24	45.7	20	14.7	24	14	20	5	40	6	27	24	31.7
	b 4	1902	4	140	4	38.2	4	38.2	4	....	.....	....	.....	4	101.7
Garden	*a* 5	1895	5	34.2	5	8.6	5	14.4	5	3	29	....	.....	5	19.8
Garfield	*a* 2	1892	4	33.5	2	7.5	2	10	0	....	.....	....	.....	4	24.7
	b 2	1901	5	135.2	3	24	4	23	2	....	.....	....	.....	5	112.8
Gosper	*b* 10	1892	11	201.3	8	23.9	11	21.1	8	....	.....	6	19	11	180.2
Greeley	*a* 2	1889	2	73	2	11	2	11	2	....	.....	....	.....	2	62
	b 4	1902	4	176.2	4	114.5	4	114.5	4	....	.....	....	.....	4	61.7

NEBRASKA—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Hall	*a* 10	1895	14	21.9	9	7	9	7.1	4			4	5	14	14.8
Hamilton	*a* 2	1884	3	56.5	1	6	3	6	1			1	0.5	3	50.5
	b 15	1897	18	103.9	14	28.1	18	25.6	14					18	78.3
Harlan	*a* 7	1892	12	42.1	7	11.4	11	10.2	6			1	5	12	32.6
	b		5	208			5	16.4	0					5	191.6
Hayes	*a* 4	1889	4	42.7	4	8.5	4	7.5	4			2	4	4	35.2
	b 16	1893	17	201.8	14	14.3	17	13	14			1	4	17	188.8
Hitchcock	*a* 3	1900	6	33.8	3	8.2	5	7.5	2					6	26.9
	b 17	1894	21	193.1	15	15.4	21	16	15			2	5	21	177.2
Holt	*a* 14	1900	15	62.6	15	49	14	50.9	14			4	14	15	14.5
Hooker	*b* 1	1905	3	213.3	3	96.7			0					3	116.7
Howard	*a* 9	1891	9	45.8	9	9	9	9	9					9	36.8
	b 4	1906	6	135.3	3	29	6	26.3	3					6	109
Jefferson	*a* 8	1877	8	59	7	21.7	8	30	7			1	2	8	29
	b 6	1888	7	129.6	6	62	7	54.1	6			1	13	7	75.4
Johnson	*a* 10	1886	10	39.2	8	6.9	10	12.4	8					10	26.8
	b 10	1897	10	127.6	4	48.7	10	60	4			1	15	10	67.6
Kearney	*a* 2	1898	4	46.2	2	16	4	9.7	2					4	36.3
	b 6	1891	9	169.3	5	53	9	42.2	5					9	127.1
Keith	*a* 8	1901	8	56.6	8	33.7	8	33.8	8	2	2	1	1	8	22.8
	b 2	1891	2	232.5	2	24	2	24	2					2	208.5
Keyapaha	*a* 4	1897	4	52.2	4	15	4	14.5	4			1	2	4	37.7
	b 2	1906	4	126.2	1	10	3	15	0					4	112.5
Kimball	*b* 3	1901	3	236.7	3	14.3	3	14.3	3					3	222.3
Knox	*a* 16	1897	22	38.2	15	8.5	22	8.7	15	2	3	5	9	22	29.5
	b 2	1900	4	254.7	3	229.3	4	178	3			1	6	4	76.7
Lancaster	*a* 18	1896	24	39	15	10	21	15	12	5	38			24	25.2
	b 13	1897	15	160.7	10	35	12	79.2	7	1	20	2	8	15	92.5
Lincoln	*a* 1	1903	3	26	1	10	3	6.7	1					3	19.3
	b 11	1901	13	232.6	8	38.7	13	32.8	8					13	199.8
Logan	*a* 1	1900	2	26	1	30	2	17	1					2	9
	b 5	1898	5	194.2	5	89.6	2	105	2					5	104.6
Loup	*a* 3	1901	3	56.7	3	24.7	3	24.7	3					3	32
Madison	*a* 4	1893	6	26.5	4	4.6	6	3.1	4			3	12.5	6	23.3
	b 10	1899	15	158.1	5	115.6	15	108	5					15	50.1
McPherson	*a* 1	1909	5	46.4	3	52	2	4.5	0					5	13.4
	b 3	1905	3	217	3	186	3	186	3					3	31
Merrick	*a* 10	1890	19	28.4	4	10.5	19	13.9	4					19	14.4
Morrill	*a* 1	1898	2	33	1	15	2	14.5	1	1	2			2	18.5
	b 2	1908	3	175	2	22.5	3	21	2			2	7	3	154
Nance	*a* 2	1896	2	42.5	2	20	2	20	2					2	22.5
	b 7	1897	9	190.9	9	63.3	9	63.3	9					9	127.6
Nemaha	*a* 5	1877	9	31.4	7	8.1	9	7.8	7	1	2			9	23.7
	b		1	160			1	30	0					1	130
Nuckolls	*a* 13	1889	17	56.5	13	10.4	16	9.3	12			1	1	17	46.4
	b 5	1885	6	110.8	5	25.9	4	27.4	3					6	88.7
Otoe	*a* 10	1890	15	37.3	10	12.1	15	11.4	10	6	34	2	18	15	26
	b		3	106.7	1	105	3	55.3	1	1	1			3	51.3
Pawnee	*a* 7	1887	10	43.2	7	17.7	10	13.8	7	1	2	4	19	10	29.4
	b 1	1891	3	167.7	1	15	3	70.7	1			1	3	3	97
Perkins	*b* 7	1898	7	202.6	6	28.3	6	28.5	5					7	175.7
Phelps	*a*		3	35			3	6	0					3	29
	b 5	1892	15	189.9	8	15.5	15	18.2	8			2	4	15	171.7
Pierce	*a* 7	1894	9	40.8	6	10.5	9	9.6	6	1	2	1	2	9	31.2
	b 5	1902	6	151.7	5	96.6	5	98.6	4					6	62.8
Platte	*a* 8	1890	11	30.1	7	9.1	11	13.4	7	3	16	1	1	11	16.7
	b 11	1900	16	133.2	10	40.7	16	52.7	10					16	80.4
Polk	*b* 3	1902	6	116.2	3	16	6	15	3			2	3	6	101.2
Redwillow	*a* 1	1882	3	25	1	5	3	4	1					3	21
	b 15	1892	17	147.9	12	12.5	17	13.6	12			3	10	17	134.3
Richardson	*a* 7	1871	8	44.2	4	16.7	8	14.7	4			1	5	8	29.5
	b 2	1894	2	156.5	1	130	2	77.5	1					2	79
Rock	*a* 7	1900	8	33.6	7	29.9	8	26.9	7			1	4	8	6.7
	b 2	1906	3	150	2	72.5	3	77	2			2	4	3	73
Saline	*a* 1	1870	1	22	1	3.5	1	3.5	1					1	18.5
	b 10	1896	12	131.8	9	38.2	11	33.5	8					12	85.2
Sarpy	*a* 6	1888	6	44	6	12.5	5	11.4	5					6	31.5
	b 5	1893	6	118.7	5	37.2	6	46	5					6	72.7
Saunders	*a* 7	1896	8	49	2	11	8	10.6	2					8	38.4
	b 11	1899	11	136.1	7	50.4	9	47.8	5			1	5	11	91.3
Scotts Bluff	*a* 1	1905	5	29.4			5	4	0					5	25.4
	b 2	1906	7	128.7	1	100	7	86.4	1					7	42.3
Seward	*a* 8	1886	9	45.7	7	8.3	7	6.5	5	1	2			9	37.3
	b 8	1892	9	91.7	8	75.2	9	67.4	8			1	10	9	24.2
Sheridan	*a* 6	1897	9	41.6	6	10.4	8	11.2	5			1	4	9	31.3
	b 10	1901	13	143.5	7	19.6	13	25	7			1	1	13	118.5
Sherman	*a* 1	1879	3	51.7	1	10	3	4.3	1			1	10	3	47.3
	b 6	1898	9	150.7	5	98	9	70.2	5					9	80.4
Sioux	*b* 6	1905	9	166.9	6	29.7	9	28.6	6	1	8	1	15	9	138.3
Stanton	*a* 2	1892	2	37.5			2	12.5	0					2	25
	b 1	1895	1	150			1	25	0					1	125

NEBRASKA—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Thayer	*a* 11	1892	12	76.3	11	8	12	7.7	11	....	.....	....	.....	12	68.7
	b 5	1894	7	109.7	6	27	7	27.4	6	....	.....	....	.....	7	82.3
Thomas	*b* 3	1905	4	101.7	4	33	4	33	4	....	.....	....	.....	4	68.7
Thurston	*a* 1	1906	3	26.7	3	6.3	3	4.3	3	....	.....	2	6	3	22.3
	b	.....	1	150	1	20	1	20	1	....	.....	....	.....	1	130
Valley	*a* 2	1894	3	39.2	2	25	3	18.7	2	....	.....	....	.....	3	20.5
	b 4	1896	6	157.5	4	29.2	6	32.8	4	....	.....	....	.....	6	124.7
Washington	*a* 4	1895	4	41.2	4	10.2	3	11	3	1	2	....	.....	4	30.5
	b 2	1890	5	183.4	3	82.3	5	64.4	3	....	.....	....	.....	5	119
Wayne	*a* 6	1901	7	30.1	7	8.6	7	9.4	7	1	6	....	.....	7	20.7
	b 3	1904	4	137.5	3	91.7	4	78.7	3	....	.....	....	.....	4	58.7
Webster	*a* 8	1898	8	52.9	5	10	8	9.4	5	....	.....	....	.....	8	43.5
	b 9	1898	9	134.7	9	12.9	9	12.9	9	....	.....	....	.....	9	121.7
Wheeler	*b* 1	1890	1	150	1	100	1	125	1	1	25	....	.....	1	25
York	*a* 5	1887	9	49.7	5	9.8	9	8	5	....	.....	2	4	9	41.7
	b 15	1892	16	102.2	10	27	16	23.9	10	....	.....	1	2	16	78.2
Total	*a*446	1891.9	589	42.6	427	14.4	558	13.3	396	59	300.0	70	254.0	589	29.2
	*b*497	1897.1	650	159.7	457	49.5	622	47.1	429	13	90.0	42	179.5	650	111.8
Aggregate	943	1894.6	1239	.....	884	.....	1180	.....	825	72	390.0	112	433.5	1239	72.5

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Adams	10	1	2	4	15	3	25	Keith	4	1	5	2	.....	2	10
Antelope	3	1	2	1	3	....	7	Keyapaha	3	1	2	.....	1	4	8
Banner	1	....	.....	.....	.....	2	2	Kimball	1	....	.....	.....	.....	3	3
Blaine	2	....	.....	2	1	2	5	Knox	6	3	13	7	2	1	26
Boone	5	....	3	4	2	4	13	Lancaster	10	2	14	14	6	3	39
Boxbutte	1	....	1	.....	.....	.....	1	Lincoln	6	....	3	.....	.....	13	16
Boyd	3	1	6	1	.....	.....	8	Logan	2	1	1	1	1	3	7
Brown	2	....	3	.....	.....	3	6	Loup	1	....	2	1	.....	.....	3
Buffalo	6	....	8	3	1	3	15	Madison	7	....	6	12	3	.....	21
Burt	4	....	2	4	5	2	13	McPherson	2	2	5	1	.....	.....	8
Butler	9	5	8	6	3	.....	22	Merrick	8	8	8	3	.....	.....	19
Cass	5	3	3	5	1	.....	12	Morrill	1	....	2	.....	.....	3	5
Cedar	6	3	8	8	2	2	23	Nance	4	....	2	.....	1	8	11
Chase	4	1	1	2	1	3	8	Nemaha	3	....	6	3	.....	1	10
Cherry	5	3	8	1	2	3	17	Nuckolls	8	....	5	9	8	1	23
Cheyenne	3	1	.....	2	.....	6	9	Otoe	7	3	8	6	1	.....	18
Clay	8	1	.....	.....	13	3	17	Pawnee	3	....	7	3	2	1	13
Colfax	5	1	4	2	4	2	13	Perkins	3	....	.....	.....	.....	7	7
Cuming	2	....	3	.....	3	1	7	Phelps	7	1	1	.....	2	14	18
Custer	12	1	9	4	5	15	34	Pierce	6	2	5	4	3	1	15
Dakota	1	3	.....	.....	.....	.....	3	Platte	9	5	7	5	7	3	27
Dawes	3	....	3	3	1	1	8	Polk	1	....	.....	.....	4	2	6
Dawson	7	2	3	.....	2	13	20	Redwillow	8	1	1	1	4	13	20
Deuel	1	....	.....	.....	.....	3	3	Richardson	4	1	2	6	.....	1	10
Dixon	6	5	11	5	.....	1	22	Rock	3	6	3	.....	1	1	11
Dodge	6	1	7	5	2	2	17	Saline	5	....	1	2	9	1	13
Douglas	3	....	3	2	.....	1	6	Sarpy	4	3	.....	5	3	1	12
Dundy	2	1	2	.....	.....	1	4	Saunders	6	1	1	8	4	5	19
Fillmore	11	....	4	10	15	2	31	Scotts Bluff	2	2	5	3	2	.....	12
Franklin	6	....	9	4	1	4	18	Seward	7	5	3	9	1	.....	18
Frontier	8	....	.....	4	1	17	22	Sheridan	7	....	4	8	6	4	22
Furnas	5	....	2	.....	2	11	15	Sherman	5	3	2	2	1	4	12
Gage	10	3	9	10	4	2	28	Sioux	3	....	.....	2	2	5	9
Garden	2	1	3	1	.....	.....	5	Stanton	1	....	2	.....	.....	1	3
Garfield	3	....	3	1	3	2	9	Thayer	6	2	.....	2	11	4	19
Gosper	4	....	.....	.....	.....	11	11	Thomas	2	....	.....	.....	4	.....	4
Greeley	2	....	.....	3	3	.....	6	Thurston	2	....	3	.....	.....	1	4
Hall	6	2	12	.....	.....	.....	14	Valley	3	....	4	.....	.....	5	9
Hamilton	9	....	1	2	18	.....	21	Washington	2	1	2	2	1	3	9
Harlan	6	2	3	8	.....	4	17	Wayne	5	1	6	3	.....	1	11
Hayes	8	....	3	2	.....	16	21	Webster	7	....	3	5	4	5	17
Hitchcock	10	....	4	3	1	19	27	Wheeler	1	....	1	.....	.....	.....	1
Holt	6	7	6	2	.....	.....	15	York	10	1	5	3	13	3	25
Hooker	1	....	.....	.....	1	2	3								
Howard	7	1	5	4	3	2	15	91 counties	442	112	322	267	231	307	1,239
Jefferson	5	4	.....	6	3	2	15	Per cent	....	9.0	26.0	21.6	18.6	24.8	.....
Johnson	7	1	6	10	1	2	20								
Kearney	6	1	2	1	2	7	13								

Reporters' remarks:

Adams County: "Wells never go dry here." Antelope County: "Ground water is 4 to 6 feet higher than in 1871; changes in cycles of 8 to 12 years." Boone County: "No noticeable change in water level in 40 years." Boyd County: "Several wells failed and some springs on account of dry summer." "Two springs broke out about 12 years ago and never go dry; one is fed by underflow from plow land and the other by underflow from upper part of the draw." Brown County: "No change in the amount of water in wells." Buffalo County: "Have never known a well to go dry in 25 years." "Never knew a well to fail; depth according to height of land from Platte River." "Never knew a spring to go dry." "Water always the same, regardless of dry or wet seasons." Burt County: "Water in surface wells about the same as 30 years ago for 5-year periods." "Several wet years of late; all the wells have much more water than formerly." Butler County: "In 31 years the sheet water in tableland has settled from 5 to 7 feet." Cedar County: "Since the country has been settled up and more land under cultivation, there seems to be more water in the soil, and there are more springs than formerly because more of the rain falling on the plowed land soaks into it and less runs off to make floods." "The breaking up of prairie sod has had the effect of lowering the water level at least a few feet." Chase County: "In no case has the water-table changed, and the supply remains the same." "The water is sheet water, and it is the same all the time." Cherry County: "The ground water seems to be 2 feet lower all over the county." Cheyenne County: "A spring started; a well went dry when another was dug some miles distant." "Two creeks—Lawrence and Lodgepole—have gone dry; probably caused by irrigation in Wyoming." Clay County: "Bored wells, tubular wells, dug wells, and driven wells are all the same depth, and all yield inexhaustible supply; all rain or no rain has no effect whatever; such a thing as a well going dry or giving out never was heard of." Colfax County: "Dug wells are giving out one by one." Custer County: "In 25 years have never known a well to fail." Dawson County: "Ground water level is all the same, and no changes have been noticed." From 25 years' experience reporter infers water level to be fixed by Platte River, which marks the crest of a watery ridge inclining northward and southward. "Wells are all the same; wells 20 years old still throw the same amount of water." "Since we have had irrigation ditches, water has risen in all wells 3 to 8 feet." Dixon County: "As to supply of water, can not see any difference for the last 30 years." Dundy County: "The water level seems to be the same as when the country was settled, 25 years ago." Fillmore County: "Never heard of a well going dry." "Wells drilled to reach gravel never dry since 1872, when county was settled." "No change since 40 years ago." "Wells not affected by drought or flood; inexhaustible supply of water." "Water same as it was 30 years ago." Franklin County: "Water certain as sunshine; underflow from Platte River." Frontier County: "Wells never known to pump dry; supposed to be sheet water on a level with Republican and Platte Rivers." "Old wells dug by hand are being abandoned because of lack of supply after 20 years of service." "Sheet water; same level as streams." "Water in wells supposed to be from North Platte River remains the same as when dug; many springs supply the creeks, and none have failed since 1885." Furnas County: "We have sheet water; you can pump the wells day and night and it does not faze them." Gage County: "Wells all stationary; have sheet water, supposed to come from the mountains under the Pierre clay." "There seems to be a less supply of water in the rough land than formerly, while in the level land it remains the same." Garfield County: "Water stays the same level with the river." Gosper County: "The ground water level for wells south of the divide is the Platte, now dry." "We have sheet water flowing from north to south." "Sheet water wells to sufficient depth never go dry." Greeley County: "Water is the same in depth in dry and wet seasons." Hall County: "All wells shallow; the crops draw water from below." Hamilton County: "Droughts seem to have no

effect on water supply." "Never any noticeable change in depth of water in wells, and no failures." "For 37 years there has been no change in wells." Hayes County: "Water in wells is always the same depth; one well with only 20 inches of water pumped a full stream for over 20 years." "All wells are drilled into sheet water, and if down to a coarse gravel never fail, and the water is unlimited." "Water level has remained the same for the last 25 years." Hitchcock County: "Water never rises or lowers; we have what is called sheet water." "Wells are in sheet water; the dry season does not change it, neither has the change from a cattle country to a farming one." Holt County: "Wells never fail; the water is on a level." Howard County: "Water seems to be the same as 30 years ago." "Wells reaching the level of Loup River always get plenty of water; not affected by wet or dry weather." Jefferson County: "Where cultivation is least practiced the springs are either normal or stronger, and are either weaker or dried up where it is practiced most extensively; we have lost many springs without the gain of a single one during my lifetime." "Water level has not changed in the last 30 years." Johnson County: "Water in deep wells stands at same level; dug wells often play out." "Very little change in water supply in dry seasons; no change in springs; cultivation does not affect springs." "Two wells have failed." Kearney County: "At the level of Platte River the water never fails." "Water about the same depth as always and the supply abundant." Keyapaha County: "Back from the rivers the country is well watered; no change in years." "Have not heard of any failure in 25 years." Kimball County: "Wells are nearly the same depth on divides, and if sheet water is struck there is an inexhaustible supply; no lowering of water." Knox County: "We have two blowing or sucking wells affected by the river, more active during a storm; shallow wells sometimes fail; deep wells seem to strike sheet water and are unfailing." Lancaster County: "No variation in water level for the last 40 years." Lincoln County: "Water found in a sand and gravel stratum sloping gently southeastward, and neither rises nor falls; pumping continuously does not lower it; so for 25 years." "All this country is underlain with sheet water; no variation in depth." Loup County: "Wells all run down to sheet water; no change in supply." Madison County: "Gravel water will rise to level of surface water; not lowered by pumping." "All dug wells dried up; permanent at 65 to 150 feet." McPherson County: "The whole country is underlain with sheet water, always about the same level." Merrick County: "We have what is called sheet water; never heard of a well failing." Nance County: "Country is well watered with permanent sheet water." "Water is just as it was 17 years ago and is never-failing." "Wells are not affected by surface water." "Country is underlain with water-bearing gravel." Nuckolls County: "All sheet water in sand and gravel." Otoe County: "Water scarce in dry times; plenty now." "Wells are affected by surface water." "No change in the last 25 years." Perkins County: "Never heard of a well going dry." "There has never been a well went dry where of proper depth." "Wells are all drilled to sheet water; no known change in water level." Phelps County: "All wells are fed from sheet water." Pierce County: "Springs are better than they were 25 years ago." "Wells are sunk to a bed of gravel which lies nearly on a level; unfailing and not subject to drought." Platte County: "The ground water level is the same as running water in creeks or rivers; water in sand or gravel; enough to irrigate all the land if it could be pumped." "The water level has not changed; wells have flowed 15 years without diminishing." Redwillow County: "No change in depth of water since wells were drilled." "Failure of water is unknown." "The water is sheet water flowing through a bed of sand or gravel and has not varied in 30 years." "Water is falling fast; water in wells that have been measured is 4 feet lower." "Have never noticed water to rise or fall in wells in 29 years." Richardson County: "No apparent change in water sinking or rising for 50 years." "In 45 years some springs have stopped and started again, but sand springs never fail." "Wells to sheet water, and not affected by anything; the pump could not lower them

an inch; dug wells are affected by continuous drought." Rock County: "A sheet water country, therefore never a scarcity of water." "Wells seem to be going down somewhat of late; just before a big storm the water rises." "Never knew a well put down to gravel to go dry." Saline County: "When wells are put down to coarse gravel the water remains the same; the depth varies only as the land varies from high to low." "Have to go down to water level in sand or gravel; drought does not affect the supply." Sarpy County: "All wells made to sheet water." "Dug or bored wells have failed for the last 40 years, one after another, with a few exceptions; tubular wells [to sheet water] have taken their place and never fail." "Wells just as good and just as much water in them as when made." Seward County: "Water found nearly on the same level in the ground." "Wells are inexhaustible and never known to vary an inch." Sheridan County: "Wells all have to go down to about a certain level to get plenty of water, but never fail." "This is a sheet-water country, and the water level dropped about 4 feet between 1895 and 1899." "All wells to the same sheet water." Sherman County: "Wells all drilled to sheet water." "One well reaches sheet water; there is an unfailing supply." "All wells must go to the level of the river." Sioux County: "Never any shortage of water; deep wells on high divides, shallow wells in low places." Thayer County: "Water will never give out and is always the same in depth." "We have sheet water, so dry weather has no effect on the water supply." "Water in wells never varies, and can not be pumped down." Thomas County: "Some wells are deeper than others, according to location, but the water line never changes." "All wells reach water on a level with river and never go dry or change in depth." Thurston County: "Water level from 2 to 4 feet lower than for years in dug wells and somewhat down in hydraulic wells." "No indications of failure or lessening of supply." Valley County: "Wells all go to river level and have not lowered in 32 years." "Wells go down to gravel; no change in water level." "Water runs on a general level and is inexhaustible; depth depends on the lay of the land." Washington County: "Wells sometimes deepened." Wayne County: "The deep wells can not be pumped dry and remain the same from year to year." Webster County: "The wells reach the same water level, varying in depth according to the lay of the land; no noticeable variation in the depth of the water." "A spring has been dry for 25 years—caused by city pumping." "Water all found on a level that dips southward; a never-failing supply." Wheeler County: "Ponds lower than at any time since 1894." York County: "The ground water level is all the same; the depth of wells depends on elevation of the ground; wells never give out—just as good as 28 years ago." "Water in wells is always the same; in 40 years never saw any change." "Wells all have the same undercurrent; drought has no effect; they never go dry." "There is a sheet of water all over this country that never fails; the springs are just the same as the wells." "All wells in this part of the country are watered by the Platte, and can not be diminished by pumping, the water being on a level with the river."

Despite a few apparent discrepancies (due of course to local conditions), the reporters' remarks reveal general recognition of a common source of supply for wells, springs, and streams throughout the greater part of the State—a subterranean water body commonly found in sand or gravel at a fairly uniform horizon, inclining eastward at about the same rate as the land surface and widely known as "sheet water." The level of this water is generally recognized as corresponding with that of the Platte and other rivers over the divides no less than on the river bottoms; and while a majority of the reporters have observed no change in level of the water sheet during several decades since settlement, others in different localities note a

gradual lowering in its upper level. As elsewhere, the remarks are in notable accord with the schedule records; of the 825 bi-state wells, 72 reveal rise and only 112 lowering of the water, giving a mean minimum lowering of only 0.034 foot per decade.

NEVADA.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Churchill	*a* 3	1907	3	14.7	3	1.8	3	2.7	3	3	2.5	....	.....	3	12
Clark	*a*	.....	4	28.7	....	.....	4	4.2	0	....	.....	....	.....	4	24.5
Elko	*a* 3	1900	3	18.7	3	6.3	3	3.2	3	....	.....	2	9.5	3	15.5
Esmeralda	*a*	.....	5	39.6	....	.....	5	7.8	0	....	.....	....	.....	5	31.8
	b	.....	1	125	....	.....	1	40	0	....	.....	....	.....	1	85
Eureka	*a* 1	1890	2	22.5	2	6	2	5	2	....	.....	1	2	2	17.5
Humboldt	*a* 2	1909	7	34.4	2	10.5	7	7.9	2	1	1	....	.....	7	26.6
Lyon	*b* 1	1910	3	157	....	.....	3	136.3	0	....	.....	....	.....	3	20.7
Nye	*a* 1	1903	1	20	1	10	1	10	1	....	.....	....	.....	1	10
White Pine	*a* 5	1897	5	22.8	5	9.6	5	12.8	5	1	22	2	6	5	10
Total	*a* 15	1901.5	30	27.8	16	7.2	30	7.1	16	5	25.5	5	17.5	30	20.7
	b 1	1910.0	4	149.0	0	.....	4	112.2	0	....	.....	....	.....	4	36.7
Aggregate	16	1902.1	34	.....	16	.....	34	.....	16	5	25.5	5	17.5	34	22.6

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	Total.	County.	Cor.	A.	B.	C.	D.	Total.
Churchill	1	1	2	....	.....	3	Lyon	1	1	1	1	.....	3
Clark	2	1	2	1	.....	4	Nye	1	.....	1	.....	.....	1
Elko	2	.....	3	....	.....	3	White Pine	3	3	2	.....	.....	5
Esmeralda	2	1	2	1	2	6							
Eureka	1	1	1	.....	.....	2	9 counties	16	9	18	5	2	34
Humboldt	3	1	4	2	.....	7	Per cent	....	26.5	52.9	14.7	5.9	.....

Reporters' remarks: The few remarks by reporters are conformable with those of neighboring Cordilleran States in which the wells recorded are within valleys affected by irrigation.

NEW HAMPSHIRE.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Belknap	*a* 2	.....	2	22.5	2	13	2	13	2	....	.....	....	.....	2	9.5
Carroll	*a* 3	1873	5	18.6	3	12	5	6.6	3	....	.....	3	11	5	12
Cheshire	*a* 3	1853	3	19.3	3	6.7	3	4.3	3	....	.....	3	7	3	15
Grafton	*a* 3	1835	3	23	2	21	3	11.7	2	....	.....	1	10	3	11.3
Hillsboro	*a* 1	1860	3	18.7	3	8.7	3	3.3	3	....	.....	3	16	3	15.3
Rockingham	*a* 5	1849	5	17	5	9.6	5	4	5	....	.....	4	28	5	13
	b 1	1890	1	200	1	56	1	50	1	....	.....	1	6	1	150
Strafford	*a* 1	1840	1	33	....	.....	1	3	0	....	.....	....	.....	1	30
Sullivan	*a* 2	1850	2	17.5	....	.....	2	6	0	....	.....	....	.....	2	11.5
Total	*a* 20	1845.3	24	19.7	18	11.0	24	6.3	18	0	0.0	14	72.0	24	13.4
	b 1	1890.0	1	200.0	1	56.0	1	50.0	1	0	0.0	1	6.0	1	150.0
Aggregate	21	1847.4	25	.....	19	.....	25	.....	19	0	0.0	15	78.0	25	18.9

NEW HAMPSHIRE—Continued.

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	E.	Total.	County.	Cor.	A.	B.	E.	Total.
Belknap	1	1	1	.....	2	Strafford	1	.....	1	.....	1
Carroll	2	1	4	.....	5	Sullivan	1	1	1	.....	2
Cheshire	2	1	2	.....	3						
Grafton	2	.....	3	.....	3	8 counties	12	6	18	1	25
Hillsboro	1	.....	3	.....	3	Per cent	.....	24.0	72.0	4.0	.....
Rockingham	2	2	3	1	6						

Reporters' remarks:

Cheshire County: "I am 70 years old and see no difference in the depth of water; my wells are about 3 feet lower now than commonly." Grafton County: "Streams are not so large as 30 years ago; some springs carry less water." Rockingham County: "Many wells go dry; 40 years ago there were no dry wells." Sullivan County: "Many wells have been nearly dry."

NEW JERSEY.

NORTHERN.

County.	Dates.		Wells.		Original water.		Present water.		Bi-State.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Bergen	*a* 2	1894	6	29.2	3	6.7	6	6.3	3	1	2	2	4	6	22.8
	b 1	1910	4	80.7	2	44.5	4	49.2	2	....	.....	2	6	4	31.5
Essex	*a* 3	1865	4	27.5	3	4.3	4	3.2	3	....	.....	3	4	4	24.2
	b	.....	2	160	....	.....	2	160	0	....	.....	....	.....	2	0
Hudson	*a* 2	1883	2	9	2	5.5	2	2.7	2	....	.....	2	5.5	2	6.2
Hunterdon	*a* 21	1858	34	30.6	19	12.9	34	7.9	19	1	2	8	73	34	22.7
Morris	*a* 3	1865	3	23.3	3	4.7	3	4.7	3	....	.....	....	.....	3	18.7
Passaic	*a* 2	1902	2	18	2	5	2	3	2	....	.....	2	4	2	15
Somerset	*a* 5	1855	9	25.2	9	8.4	9	6	9	....	.....	4	22	9	19.2
	b 5	1901	7	108.4	5	61.6	6	53.8	5	....	.....	....	.....	6	34.2
Sussex	*a* 17	1851	21	33.8	16	8.6	21	6.7	16	1	2	13	60.5	21	27.1
	b 2	1909	2	139	2	57.5	1	110	1	....	.....	....	.....	2	81.5
Union	*a* 6	1842	8	22.7	5	6	8	3.7	5	....	.....	5	18.5	8	19.1
	b 2	1903	2	106	2	55	2	50	2	....	.....	2	10	2	56
Warren	*a* 9	1869	10	23.2	10	13	7	16.1	7	....	.....	4	9.5	10	16.2
Total	*a* 70	1859.2	99	28.8	72	9.6	96	7.1	69	3	6.0	43	201.0	99	21.8
	b 10	1904.3	17	114.2	11	56.6	15	70.0	10	0	0.0	4	16.0	16	37.9

SOUTHERN.

County.	Dates.		Wells.		Original water.		Present water.		Bi-State.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Atlantic	*a* 9	1888	15	32.5	11	21.1	10	18.9	6	....	.....	....	.....	15	15.8
Burlington	*a* 19	1844	20	21.7	18	7.4	19	5	17	....	.....	8	43	20	16.9
	b 2	1907	2	202.5	1	80	2	82.5	1	....	.....	1	5	2	120
Camden	*a* 8	1860	10	22.5	6	8.8	10	4.6	6	....	.....	6	22	10	17.9
	b	.....	4	140	....	.....	4	130	0	....	.....	....	.....	4	10
Cape May	*a*	.....	2	20.5	....	.....	2	4	0	....	.....	....	.....	2	16.5
Cumberland	*a* 12	1884	16	41.3	10	17.3	14	4.2	8	....	.....	8	49	16	31.1
Gloucester	*a*	.....	1	22	....	.....	1	4	0	....	.....	....	.....	1	18
Mercer	*a* 8	1867	8	25.6	8	8.7	8	4.7	8	....	.....	4	32	8	20.9
	b 2	1902	2	122	....	.....	2	101	0	....	.....	....	.....	2	21
Middlesex	*a* 10	1880	14	37.3	9	20.4	14	14	9	....	.....	2	17	14	23.3
	b 2	1907	2	163	2	141.5	2	141.5	2	....	.....	....	.....	2	21.5
Monmouth	*a* 9	1859	11	33.4	9	4.4	11	3.2	9	....	.....	6	14.5	11	30.2
Ocean	*a* 1	1866	5	20.2	2	5.5	5	3.7	2	....	.....	2	9.5	5	16.5
Salem	*a* 4	1812	4	20.7	1	3	4	4	1	....	.....	1	1	4	16.7
Total	*a* 80	1863.6	106	29.7	74	12.1	98	7.2	66	0	0.0	37	188.0	106	21.5
	b 6	1905.8	10	153.5	3	121.0	10	117	3	0	0.0	1	5.0	10	36.5
State total	*a* 150	1861.6	205	29.3	146	10.9	194	7.1	135	3	6.0	80	389.0	205	21.6
	b 16	1904.9	27	126.9	14	70.4	25	88.8	13	0	0.0	5	21.0	26	37.3
Aggregate	166	1865.7	232	.....	160	.....	219	.....	148	3	6.0	85	410.0	231	23.4

PROPORTIONATE DEPTHS—NORTHERN.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Bergen	4	1	7	2	....	....	10	Sussex	8	2	13	6	1	1	23
Essex	2	2	4	....	....	....	6	Union	5	....	7	2	1	....	10
Hudson	1	2	....	....	....	....	2	Warren	4	3	6	1	....	....	10
Hunterdon	11	7	19	7	1	....	34								
Morris	1	....	3	....	....	....	3	10 Counties	42	18	70	23	3	1	115
Passaic	1	....	2	....	....	....	2	Per cent	....	15.6	60.9	20.0	2.6	0.9	....
Somerset	5	1	9	5	....	....	15								

PROPORTIONATE DEPTHS—SOUTHERN.

Atlantic	7	4	10	1	....	....	15	Monmouth	4	1	6	3	1	....	11
Burlington	8	5	12	3	1	1	22	Ocean	3	....	5	....	....	....	5
Camden	3	2	12	....	....	....	14	Salem	2	....	4	....	....	....	4
Cape May	1	....	2	....	....	....	2								
Cumberland	5	2	6	8	....	....	16	11 Counties	45	16	78	19	2	1	116
Gloucester	1	....	1	....	....	....	1	Per cent	....	13.8	67.2	16.4	1.7	0.9	....
Mercer	5	....	9	1	....	....	10								
Middlesex	6	2	11	3	....	....	16								

Reporters' remarks:

Sussex County: "Most wells are dry and half of the springs are half dry." "A spring is now nearly dry for the third year in succession." Union County: "Wells are all dry, and the springs and also brooks; the reason given for it is that the * * * Water Company are drawing all the water from us with driven wells all the way from 40 to 100 feet deep; they are drawing 6,000,000 or 7,000,000 gallons a day from us, and wells and springs never known to go dry before are dry now." "The pumping station for the city, a mile distant, has lowered the water in wells, in many cases drying them." "Artesian wells have lowered the water in dug wells about 2 feet or more." "The * * * Water Company pumping station lowers and drains many wells near them." Burlington County: "Many wells have had to be lowered from 2 to 4 feet as the country is cleared." Cumberland County: "The wells are dry; they are digging them deeper and are driving points in the bottoms." Monmouth County: "Wells generally are a little lower than they were 20 years ago, perhaps due to artesian wells or to clearing off the woods." Ocean County: "In dug or open wells the average depth has fallen at least 3 feet in the last 40 years."

The foregoing and other remarks by reporters from New Jersey indicate growing recognition of the interdependence among wells, springs, and streams, i. e., of the essential unity of the subsoil water body throughout each district or State. The soundness of the opinions expressed is as usual attested by the conformity of the schedule records with the remarks, though it is to be noted that the number of records from the State is less (in proportion to the aggregate number of wells) than could be desired as a basis for determining either the subsoil water level or the rate of lowering.

NEW MEXICO.

County.		Dates.		Wells.		Original water.		Present water.		Bi-State.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Bernalillo	*a*		.....	5	11.6	....	.....	5	5.4	0	....	.....	....	.....	5	6.2
Chaves	*a*	2	1906	7	30.6	3	7	7	3.6	3	....	.....	2	10.5	7	26.9
	b	9	1902	13	139.8	7	72.3	13	58.7	7	....	.....	3	111	13	81.2
Colfax	*a*	7	1908	11	24.8	11	3.9	11	6	11	3	26	3	3.5	11	18.9
Curry	*b*	8	1907	12	256	10	73.6	12	66.4	10	....	.....	....	.....	12	139.6
Dona Ana	*a*	7	1906	9	44.8	8	5.7	9	4.2	8	....	.....	6	13	9	40.6
Eddy	*a*	5	1901	8	30.5	3	3.7	8	9	3	3	35	....	.....	8	21.5
	b	3	1909	3	703.3	2	950	3	646.7	2	....	.....	....	.....	3	56.7
Grant	*a*	4	1896	4	26.5	4	2.5	4	4.5	4	3	11	1	3	4	22
Guadalupe	*a*	4	1906	4	19.7	4	5	4	5	4	....	.....	....	.....	4	14.7
	b	2	1908	2	164	2	150	2	150	2	....	.....	....	.....	2	14
Lincoln	*a*	2	1906	4	20.2	2	5.5	4	3.9	2	....	.....	2	7.5	4	16.4
	b	4	1903	4	234	4	158.5	4	174.5	4	2	66	1	2	4	59.5
Mora	*a*	6	1901	6	32.5	6	5.7	6	5.5	6	....	.....	1	1	6	27
	b	3	1909	3	182.7	....	.....	3	82	0	....	.....	....	.....	3	100.7
Otero	*a*	2	1900	4	19.5	2	9	4	8	2	....	.....	....	.....	4	11.5
Quay	*a*	10	1906	11	32.4	10	7.5	11	7.5	10	1	12	2	9	11	24.8
	b	9	1907	10	156.2	8	51.1	10	59.9	8	....	.....	....	.....	10	96.3
Roosevelt	*a*	2	1905	4	31.2	2	11	2	5	0	....	.....	....	.....	4	23.2
	b	21	1907	21	130	20	39.7	17	45.4	16	....	.....	....	.....	21	90
Sandoval	*a*	3	1894	3	17.7	3	2	3	2	3	....	.....	....	.....	3	15.7
San Juan	*a*	3	1895	5	17.4	4	2.4	5	3.6	4	1	6	2	3.5	5	13.8
	b		.....	1	124.5	1	112	1	112	1	....	.....	....	.....	1	12.5
San Miguel	*a*		.....	1	10	....	.....	1	2	0	....	.....	....	.....	1	8
	b		.....	1	250	....	.....	1	125	0	....	.....	....	.....	1	125
Santa Fe	*b*	3	1907	5	168	....	.....	5	54	0	....	.....	....	.....	5	114
Sierra	*a*	2	1884	2	46.5	2	15	2	15	2	....	.....	....	.....	2	31.5
	b	1	1909	1	250	....	.....	1	150	0	....	.....	....	.....	1	100
Socorro	*a*	1	1908	1	64	1	8	1	0	1	....	.....	1	8	1	64
Taos	*a*	5	1895	7	42.6	5	9.4	7	9.4	5	....	.....	3	10	7	33.1
Torrance	*a*	7	1907	8	51.6	8	10.9	8	7.2	8	1	1	3	31	8	44.4
	b	4	1908	4	127.5	4	55	4	55	4	....	.....	....	.....	4	72.5
Union	*a*	9	1899	11	36.9	8	7.6	11	11.7	8	5	36.5	....	.....	11	25.2
	b	12	1908	16	165.6	11	31.8	16	31.1	11	....	.....	2	26	16	134.5
Valencia	*a*		.....	3	20	....	.....	3	5	0	....	.....	....	.....	3	15
	b	3	1904	3	174	3	41	3	41	3	....	.....	....	.....	3	133
Total	*a*	81	1902.0	118	31.3	86	6.5	116	6.6	84	17	127.5	26	100.0	118	24.7
	b	82	1906.5	99	184.3	72	84.5	95	80.1	68	2	66.0	6	139.0	99	106.8
Aggregate		163	1904.3	217	.....	158	.....	211	.....	152	19	193.5	32	239.0	217	62.1

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Bernalillo	2	4	1	....	....	....	5	San Juan	3	1	5	....	....	....	6
Chaves	6	1	8	7	1	3	20	San Miguel	1	1	....	....	....	1	2
Colfax	4	2	9	....	....	....	11	Santa Fe	1	....	....	1	....	4	5
Curry	4	3	....	....	....	9	12	Sierra	1	....	1	1	1	....	3
Dona Ana	4	4	2	1	....	2	9	Socorro	1	....	....	....	1	....	1
Eddy	4	3	5	2	....	1	11	Taos	3	....	5	2	....	....	7
Grant	2	....	3	1	....	....	4	Torrance	4	....	4	6	....	2	12
Guadalupe	3	....	6	....	....	....	6	Union	9	3	7	3	2	12	27
Lincoln	3	2	3	....	3	....	8	Valencia	2	....	3	....	....	3	6
Mora	3	....	3	3	1	2	9								
Otero	1	2	2	....	....	....	4	23 counties	78	30	79	37	19	52	217
Quay	7	3	7	5	2	4	21	Per cent	....	13.8	36.4	17.0	8.8	24.0	....
Roosevelt	9	1	2	5	8	9	25								
Sandoval	1	....	3	....	....	....	3								

Reporters' remarks:

Chaves County: "Weak supply at the best; have lost about half, due to two years of drought." Curry County: "Wells just as when first drilled; water seems to be a sheet—inexhaustible." Dona Ana County: "Water level has risen 2 or more feet in 20 years." Union County: "Wells down in sheet water; large windmills have no effect on water."

Other remarks attribute rise of water level in wells to irrigation, for 17 of the 43 dug wells reported from the State show an aggregate rise of 127.5 feet as against an aggregate lowering of 100 feet in the remaining 26 wells. Unfortunately the records do not cover some of the most interesting localities within the State at which extensive irrigation by pumping is practiced.

NEW YORK.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Albany	*a* 16	1861	18	16.6	18	8.5	18	4.1	18	....	.....	16	78	18	12.5
Allegany	*a* 6	1869	13	21.6	9	5.8	13	4.4	9	....	.....	3	7	13	17.2
	b 3	1908	10	131.2	3	53.3	10	51.5	3	....	.....	....	.....	10	79.7
Broome	*a* 11	1863	11	29.1	11	7.7	11	3	11	....	.....	10	52	11	26.1
Cattaraugus	*a* 12	1885	13	31.5	7	17.6	12	9.2	6	....	.....	1	20	13	19.2
	b 8	1906	11	117.5	6	149.3	8	76.9	3	....	.....	2	63	11	24.1
Cayuga	*a* 8	1838	13	22.7	7	9.7	13	5.2	7	....	.....	5	40	13	17.5
	b 3	1889	5	92.2	2	95	5	61	2	....	.....	....	.....	5	31.2
Chautauqua	*a* 3	1874	3	32.7	1	6	3	10.3	1	....	.....	....	.....	3	22.3
	b 6	1907	6	103	5	90.4	5	49.4	4	....	.....	....	.....	6	21
Chemung	*a* 8	1874	8	22.4	8	9.2	8	6.4	8	....	.....	4	23	8	16.1
	b 2	1903	2	103.5	2	71.5	2	71.5	2	....	.....	....	.....	2	32
Chenango	*a* 3	1891	7	18.3	6	7.5	7	4.6	6	....	.....	5	14.5	7	13.6
	b	.....	2	175	....	.....	2	125	0	....	.....	....	.....	2	50
Clinton	*a* 8	1865	12	24	11	6.8	9	5.1	8	....	.....	3	18	12	18.6
	b 4	1897	4	102.6	3	47.7	4	38.7	3	....	.....	....	.....	4	63.9
Columbia	*a* 20	1847	27	24.2	13	6.2	27	5.4	13	....	.....	5	17	27	18.7
	b 3	1896	3	162	2	189.5	3	131.3	2	....	.....	....	.....	3	30.7
Cortland	*a* 4	1887	4	42	4	12.5	4	9	4	....	.....	2	14	4	33
Delaware	*a* 2	1872	5	22.6	5	8.4	5	5.5	5	....	.....	5	14.5	5	17.1
Dutchess	*a* 2	1883	7	34.9	2	22.5	7	12	2	....	.....	2	10	7	22.9
	b 1	1910	2	115	1	80	2	87.5	1	....	.....	1	5	2	27.5
Erie	*a* 17	1878	24	27.7	20	11.8	24	8.3	20	....	.....	14	59	24	19.4
Essex	*a* 14	1840	21	22.6	14	10.7	21	6.1	14	....	.....	12	60.5	21	16.5
Franklin	*a* 2	1892	2	17.5	1	8	2	5.5	1	....	.....	1	1	2	12
	b 3	1908	3	118.3	3	67	3	67	3	....	.....	....	.....	3	51.3
Fulton	*a* 5	1859	7	15.7	5	4	7	3.1	5	....	.....	3	5	7	12.6
Genesee	*a* 13	1881	15	34.3	10	15.3	15	14.7	10	....	.....	1	2	15	19.6
Greene	*a* 7	1849	9	25.3	4	11.2	9	6.9	4	....	.....	....	.....	9	18.4
Hamilton	*a* 3	1869	4	23.2	3	6	4	0.5	3	....	.....	3	18	4	22.7
Herkimer	*a* 8	1858	8	31.6	4	16.5	8	7.8	4	....	.....	4	24.5	8	23.8
Jefferson	*a* 12	1855	20	21.7	12	12.2	20	7.5	12	....	.....	6	33	20	14.2
	b 2	1888	2	93	2	77	2	62.5	2	....	.....	2	29	2	30.5
Lewis	*a* 1	1870	1	9	....	.....	1	4	0	....	.....	....	.....	1	5
Livingston	*a* 22	1854	30	22.9	22	6.9	30	5.3	22	....	.....	15	53.5	30	17.5
	b 5	1894	5	119.8	4	55	5	54	4	....	.....	....	.....	5	65.8
Madison	*a*	.....	2	26.5	2	13.5	2	13.5	2	....	.....	....	.....	2	13
Monroe	*a* 17	1871	20	29.6	14	11.1	17	8.2	11	....	.....	7	63	20	20.9
Montgomery	*a* 3	1868	3	22	3	13	3	12	3	....	.....	2	3	3	10
Niagara	*a* 8	1865	8	36.9	6	11.2	8	8.3	6	....	.....	2	6.5	8	28.6
Oneida	*a* 8	1874	9	23.4	8	6.9	9	6.2	8	....	.....	2	3	9	17.2
	b 1	1906	1	100	....	.....	1	5	0	....	.....	....	.....	1	95
Onondaga	*a* 16	1858	16	26.5	13	9.3	16	5.1	13	....	.....	12	70	16	21.4
	b 3	1883	3	86.7	2	5	3	10	2	....	.....	2	10	3	76.7
Ontario	*a* 7	1869	9	29.7	7	10.3	9	8.6	7	....	.....	2	9	9	21.1
	b 1	1906	3	108.3	1	25	2	22.5	0	....	.....	....	.....	3	85
Orange	*a* 13	1862	15	28.9	13	10.7	15	3.2	13	....	.....	12	100	15	25.7
	b 1	1909	1	353	1	228	1	228	1	....	.....	....	.....	1	125
Orleans	*a* 11	1866	13	23.1	11	8.5	13	6.2	11	....	.....	9	38	13	16.8
Oswego	*a* 11	1860	15	24.7	12	10.2	15	7.9	12	....	.....	4	18	15	16.8
Otsego	*a* 11	1874	11	18.5	11	6.3	11	5.7	11	....	.....	5	6	11	12.8
	b 5	1902	5	143	3	101.7	5	113	3	....	.....	....	.....	5	30
Putnam	*a* 1	1890	7	19.6	1	20	7	5.7	1	....	.....	1	10	7	13.9
	b 2	1908	3	123.3	2	95.5	3	113.7	2	....	.....	....	.....	3	9.7
Rensselaer	*a* 7	1827	8	27	5	11.2	8	10.1	5	....	.....	5	9	8	16.9
St. Lawrence	*a* 16	1864	17	15.8	17	7.8	16	4.1	16	....	.....	13	63	17	11.7
Saratoga	*a* 3	1874	3	30.7	3	5.7	3	4.3	3	....	.....	2	4	3	26.3
Schenectady	*a*	.....	7	18.1	5	8.8	7	4.4	5	....	.....	5	21	7	13.7
Schoharie	*a* 9	1869	11	16.3	9	8.4	11	4.3	9	....	.....	9	40	11	12
Schuyler	*a* 10	1874	13	19.2	12	9.4	13	4	12	....	.....	12	60	13	15.1
	b 3	1904	3	69.7	3	45.7	3	44	3	....	.....	1	5	3	25.7
Seneca	*a* 9	1862	12	24.7	9	10.7	12	6.7	9	....	.....	5	33	12	18
Steuben	*a* 8	1861	17	17.5	9	5.7	17	4.4	9	....	.....	4	15.5	17	13.1
	b 1	1908	1	62	1	40	1	40	1	....	.....	....	.....	1	22
Sullivan	*a* 14	1870	17	26	16	8.9	15	4.2	14	....	.....	13	71.5	17	21.8
	b 1	1894	1	70	1	50	....	.....	0	....	.....	....	.....	1	20
Tioga	*a* 17	1860	17	24	17	9.9	17	6.8	17	....	.....	11	53	17	17
	b 3	1893	3	65.7	2	54	3	47.7	2	....	.....	....	.....	3	18.2

NEW YORK—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Tompkins	*a* 12	1864	13	21.2	13	9.2	13	5.6	13	....	.....	10	46.5	13	15.6
Ulster	*a* 6	1873	12	19.8	2	6.5	12	5.8	2	....	.....	2	1.5	12	14
	b 2	1907	3	216.7	2	23.5	3	13.3	2	....	.....	2	17	3	203.3
Warren	*a* 4	1882	9	22.7	9	6.6	9	7.7	9	4	19	5	9	9	15
	b 1	1908	1	80	1	48	1	48	1	....	.....	....	.....	1	32
Washington	*a* 9	1822	10	30.1	10	13.8	10	7.2	10	....	.....	8	66	10	22.9
Wayne	*a* 12	1842	17	29.4	8	7.9	17	6.5	8	....	.....	3	10	17	22.9
Wyoming	*a* 9	1876	10	20.6	7	14.6	10	11.5	7	....	.....	....	.....	10	9
	b 1	1904	1	100	1	80	1	85	1	1	5	....	.....	1	15
Yates	*a* 6	1861	7	20.6	6	8.3	7	7.2	6	....	.....	4	4.5	7	13.4
	b 1	1900	1	60	....	.....	1	42	0	....	.....	....	.....	1	18
Total	*a* 464	1863.3	610	24.2	455	9.5	600	6.4	445	4	19.0	289	1,398.5	610	17.8
	b 66	1900.9	85	118.3	53	80.9	79	65.1	47	1	5.0	10	129.0	85	49.3
LONG ISLAND.															
Nassau	*a* 9	1876	11	43.4	8	5.7	11	6.4	8	....	.....	4	3.5	11	37
	b 4	1889	4	121.7	3	80	4	85	3	....	.....	....	.....	4	36.7
Queens	*a* 5	1869	5	51.8	5	8.5	5	2.4	5	....	.....	5	30.5	5	49.4
Suffolk	*a* 18	1862	22	27.5	17	5.8	22	4.6	17	....	.....	7	14.5	22	22.9
	b 6	1903	7	104.1	6	19.7	7	16.1	6	....	.....	3	13	7	88
Total	*a* 32	1861.5	38	35.3	30	6.2	38	4.8	30	0	0.0	16	48.5	38	30.5
	b 10	1897.1	11	110.5	9	39.8	11	41.2	9	0	0.0	3	13.0	11	69.4
State total	*a* 496	1863.1	648	24.9	485	9.3	638	6.3	475	4	19.0	305	1,447.0	648	18.5
	b 76	1900.4	96	117.4	62	74.9	90	62.1	56	1	5.0	13	142.0	96	51.6
Aggregate	572	1868.1	744	.....	547	.....	728	.....	531	5	24.0	318	1,589.0	744	22.8

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Albany	6	2	16	....	....	....	18	Onondaga	7	4	9	3	3	....	19
Allegany	6	1	11	5	5	1	23	Ontario	4	2	5	3	1	1	12
Broome	4	....	8	3	....	....	11	Orange	6	....	11	3	1	1	16
Cattaraugus	7	8	12	2	2	....	24	Orleans	6	....	13	....	....	....	13
Cayuga	6	2	13	2	1	....	18	Oswego	6	7	6	2	....	....	15
Chautauqua	3	1	7	1	....	....	9	Otsego	8	4	10	2	....	....	16
Chemung	4	3	5	1	1	....	10	Putnam	4	2	8	....	....	....	10
Chenango	4	1	6	2	....	....	9	Rensselaer	4	2	6	....	....	....	8
Clinton	6	1	10	3	2	....	16	St. Lawrence	7	7	10	....	....	....	17
Columbia	10	4	22	3	1	....	30	Saratoga	2	....	2	1	....	....	3
Cortland	2	....	2	2	....	....	4	Schenectady	3	2	5	....	....	....	7
Delaware	2	2	2	1	....	....	5	Schoharie	4	4	7	....	....	....	11
Dutchess	3	2	6	1	....	....	9	Schuyler	7	3	11	2	....	....	16
Erie	10	4	15	5	....	....	24	Seneca	3	2	10	....	....	....	12
Essex	7	6	12	3	....	....	21	Steuben	6	7	10	1	....	....	18
Franklin	2	1	2	....	2	....	5	Sullivan	7	1	13	4	....	....	18
Fulton	3	....	7	....	....	....	7	Tioga	7	3	16	1	....	....	20
Genesee	5	3	8	4	....	....	15	Tompkins	5	2	11	....	....	....	13
Greene	4	1	8	....	....	....	9	Ulster	5	2	10	....	1	2	15
Hamilton	1	....	4	....	....	....	4	Warren	4	....	9	1	....	....	10
Herkimer	4	....	6	1	1	....	8	Washington	3	....	6	4	....	....	10
Jefferson	7	8	11	3	....	....	22	Wayne	6	....	14	3	....	....	17
Lewis	1	1	....	....	....	....	1	Wyoming	5	5	6	....	....	....	11
Livingston	11	2	25	5	3	....	35	Yates	5	4	4	....	....	....	8
Madison	1	1	1	....	....	....	2								
Monroe	6	4	11	4	1	....	20	53 counties	256	123	454	87	26	5	635
Montgomery	1	1	2	....	....	....	3	Per cent	....	17.7	65.3	12.5	3.8	0.7	....
Niagara	2	....	3	5	....	....	8								
Oneida	4	1	7	1	1	....	10								

PROPORTIONATE DEPTHS—LONG ISLAND.

County.	Cor.	A.	B.	C.	D.	E.	Total.
Nassau	6	....	8	5	2	....	15
Queens	2	....	2	1	2	....	5
Suffolk	12	4	11	9	3	2	29
3 counties	20	4	21	15	7	2	49
Per cent	....	8.2	42.8	30.6	14.3	4.1	....

Reporters' remarks:

Albany County: "Three flowing springs have dried up." Allegany County: "Some 8 years ago they cleared the timber off [a lot adjacent to a spring] and it cut the spring about half, and it has never come back; keep all the timber on the hills and you will not lack for water on the farms." "Some of the springs and dug wells have failed, due to drilling for oil." Broome County: "Some springs are entirely dry; others have reduced flow." Cattaraugus County: "A well went dry when another was drilled." "Probably 40 per cent of the springs are failing with the cutting of the timber." Chenango County: "A spring went dry, and no water has ever returned; wells and springs generally are getting lower year after year." Delaware County: "Water supply has been decreasing of late years." Erie County: "Springs are weaker and some are dry because of less timber roots to hold the water; where we used to get fair wells at 35 feet we now go 48 feet." "The level shown by wells has lowered about 2 feet in 40 years." "Springs that were good for a 4-inch stream 40 years ago run about a 2-inch stream now; some small streams dry in August now were good trout streams 40 years ago." Essex County: "Wells are drying up; they are sinking wells deeper; the water level has settled at least 2 feet." "The brooks have not so much water as they had 30 years ago." "The average water level is lower than when the country was new, perhaps 2 feet, and we have longer periods of low water." Hamilton County: "Half of all wells are dry; a number of springs are dry." Jefferson County: "The underflow is evidently much lower than it was 50 years ago; the larger part of the old springs are now quite dry in summer." Lewis County: "The forests have been newly cut off; water is getting deeper because of the drying up of or lesser amount of water delivered by springs." "Creeks are drying up which before 10 years ago were never known to cease running; reason believed to be cutting off of all timber lands which held the snow or moisture for longer periods." Livingston County: "All wells dug 60 or 70 years ago have to be deepened." "Springs are still flowing but generally furnish less water." "Nearly all wells have had to be lowered from 5 to 20 feet." Onondaga County: "Old wells were dug from 50 to 100 years ago and nearly all of them deepened by drilling from 10 to 20 feet; for the last 30 years wells have been drilled." A well went dry "on sowing a lot to alfalfa." "Most springs do not have the flow of water they did 30 years ago." Orange County: "Wells are all dug, and in 50 years a great number have entirely failed; almost all of them have a shortage of one-half." Orleans County: "Water is getting lower every year." "The water level is lower than it used to be—what are you going to do about it?" Otsego County: "The streams and springs are growing gradually smaller." "A few springs are dry, owing to removal of timber." Renssalaer County: "The water has left our hilly sections and there is no water in our spring wells for the first time in our knowledge; the unprecedented dry spell caused it." St. Lawrence County: "Two springs that were flowing 30 years ago are now dry." Seneca County: "The shortage in wells is due to the timber being cut and land cleared; 40 years ago fish were found in creeks that now go dry every year." Steuben County: "Two wells have failed; two springs have failed; springs are running less water than formerly." Sullivan County: "That the failure of many springs and wells is due to the cutting off of forest trees and leaving bare the hillsides has long been conceded in this section, as many springs have been known to fail after the land was cleared above them." Tioga County: "The water level has changed in depth about one-fourth in the last 40 years." Tompkins County: "The water level has lowered about 3½ feet in the last 30 years." Wayne County: "About 75 per cent of the springs dried up." Yates County: "Wells dry up quicker than formerly when rains are scarce as deforestation goes on." Suffolk County: "Have sunk wells for the last 15 years; the water level to-day is at least 4 feet lower than when I began the work." "The water is a foot to 18 inches lower the last 3 years."

The moderate estimates of the lowering of the subsoil water made in the reporters' remarks are fully sustained by the records from all

parts of the State; of the 531 bi-state wells, only 5 show rise and no fewer than 318 lowering of the water level. The relation between wells, springs, and streams is generally recognized by the reporters; and the transition of spring-fed trout brooks to flood-swept gullies with injudicious clearing of the land has not escaped notice.

NORTH CAROLINA.

EASTERN.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Camden	*a*			1	12	1	11	1	8	1			1	3	1	4
Beaufort	*a*	3	1892	8	15.4	6	5.5	8	5.5	6	1	1	3	4	8	9.9
	b			1	280	1	280	1	280	1					1	0
Bertie	*a*	1	1890	3	15.3	3	4.3	2	4.5	2					3	11
Bladen	*a*	3	1901	5	16.6	3	3.7	5	4.2	3					5	12.4
Brunswick	*a*			6	16.3			6	6	0					6	10.3
Carteret	*a*	9	1883	13	13.5	4	5.7	12	6.5	3			1	1	13	6
Chowan	*a*			3	11.7			3	5	0					3	6.7
	b			2	200	2	200	2	200	2					2	0
Columbus	*a*	12	1894	17	18.9	10	6.2	17	9.5	10	5	9.5	2	7.5	17	9.4
	b	2	1906	2	175			2	175	0					2	0
Craven	*a*			5	26.8			5	10.4	0					5	16.4
Cumberland	*a*	11	1889	18	22.4	9	5	18	5.2	9			2	3	18	17.3
Dare	*a*			2	6.5			2	4	0					2	2.5
Duplin	*a*	14	1863	18	20	13	9	18	9.8	13	4	7.5	3	8	18	10.2
	b	3	1896	5	151			5	134.6	0					5	16.4
Edgecombe	*a*	7	1895	12	21.4	3	6.3	12	7.2	3	2	4			12	14.2
Greene	*a*	3	1868	5	20.8	3	7.3	5	7.2	3			2	2	5	13.6
Hertford	*a*	3	1883	4	15.5	4	4.7	4	6.7	4	3	8			4	8.7
Hyde	*b*	1	1909	1	142	1	142	1	142	1					1	8
Johnston	*a*	5	1874	10	17.4	8	7	10	7.4	8	2	3.5			10	9.9
Jones	*a*	2	1835	2	21.5	2	7	2	5	2			2	4	2	16.5
	b	2	1902	2	75			2	30	0					2	45
Lenoir	*a*	3	1894	4	15.5	3	5.7	4	4.7	3	1	1	1	2	4	10.7
	b	3	1907	3	150	3	150	3	150	3					3	0
Northampton	*a*	11	1873	13	23	8	4.7	13	4	8			5	9.5	13	19
Onslow	*a*	3	1864	5	17.2			5	9.2	0					5	8
Pamlico	*a*			2	7			2	2.5	0					2	4.5
Pasquotank	*a*	3	1900	4	13.7	3	9.3	4	5.5	3			2	9	4	8.2
Pitt	*a*	3	1833	4	14.5	4	7	4	6.5	4	1	1	2	3	4	8
	b	3	1905	3	96.7	3	23.3	3	20	3			1	10	3	76.7
Robeson	*a*	3	1898	7	16.9	3	4.3	7	6	3					7	10.9
	b	1	1897	4	131.2	4	131.2	4	131.2	4					4	0
Sampson	*a*	1	1906	3	19.3	3	5	3	5	3					3	14.3
Scotland	*a*	12	1901	12	28.6	10	5.4	12	4	10			6	15.5	12	24.6
Tyrrell	*a*			6	13.5	2	10	6	5.8	2					6	7.7
Wayne	*a*	6	1878	10	23.2	6	9	8	7.4	4			3	9	10	15.9
Total	*a*	118	1882.4	202	19.0	111	6.4	198	6.6	107	19	35.5	35	80.5	202	12.4
	b	15	1903.3	23	145.3	14	133.4	23	127.8	14	0	0.0	1	10.0	23	17.8

WESTERN.

Alamance	*a*	9	1850	11	36.5	11	9.5	11	9	11			3	6	11	27.5
Alexander	*a*	7	1899	7	33.6	7	4.8	4	3.6	4					7	28.8
Alleghany	*a*	3	1900	5	30	3	5	5	5.8	3			1	1	5	24.2
Anson	*a*	11	1881	11	35.1	8	5.5	11	3.2	8			8	29	11	31.9
Ashe	*a*	1	1902	1	87	1	36	1	25	1			1	11	1	62
Buncombe	*a*	14	1895	17	29.9	13	5.8	17	5.3	13			4	9	17	24.6
	b	2	1906	3	90	2	18.5	3	17.3	2					3	72.7
Burke	*a*	15	1896	16	55.8	13	6.6	16	4	13			11	36	16	51.9
Cabarrus	*a*	14	1894	16	38.3	9	8	16	7.4	9			5	19	16	30.9
	b	1	1906	1	100			1	50	0					1	50
Caldwell	*a*	15	1887	15	40	12	7.6	15	6.7	12	1	1	3	7	15	33.3
Caswell	*a*			3	42.3			3	17.3	0					3	25
Catawba	*a*	9	1889	15	46.3	8	7.1	15	6.7	8	1	1	4	13	15	29.6
Chatham	*a*	23	1877	26	34.6	19	6.8	25	6.5	18	1	1	10	16	26	28.2
Cherokee	*a*			4	36.2			4	5.5	0					4	30.7
Clay	*a*			2	35			2	5	0					2	30
Cleveland	*a*	7	1884	11	45.7	9	5.3	10	4.2	8			6	11	11	41.6
Davidson	*a*	5	1861	7	49.7	5	6.2	7	7	5			1	1	7	42.7
Davie	*a*	3	1894	7	35	3	7.3	7	6.1	3			1	2	7	28.9
Durham	*a*	3	1875	3	29.7	3	4.7	3	3.8	3			3	2.5	3	25.8
Forsyth	*a*	6	1879	11	47.8	7	4.6	11	4.2	7			2	5	11	43.6
Franklin	*a*	7	1889	9	29.1	9	5.4	9	4.8	9	1	2	7	8	9	24.3

NORTH CAROLINA—Continued.

WESTERN—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Gaston	a 11	1895	15	43.4	14	6.7	15	5.3	14	....	.....	8	22	15	38.1
Granville	a 9	1878	9	31.3	9	6.6	9	5.1	9	....	.....	5	13.5	9	26.3
Guilford	a 6	1883	11	41.1	6	6.3	11	7.1	6	....	.....	2	4	11	34
Halifax	a 10	1882	10	28.5	5	7.4	10	6.5	5	....	.....	2	11	10	22
Harnett	a 11	1893	12	26.9	10	10.2	12	7	10	1	2	6	32.5	12	19.9
Haywood	a 3	1896	3	28.7	3	6	3	6	3	....	.....	....	.....	3	22.7
Henderson	a 2	1890	3	33.3	2	4.5	3	6.3	2	2	2	....	.....	3	27
Iredell	a 16	1883	18	50	15	6.2	18	5.1	15	....	.....	5	17.5	18	44.9
Lee	a 3	1870	6	40.3	....	.....	6	5.1	0	....	.....	....	.....	6	35.2
	b	.....	2	275	....	.....	....	.....	0	....	.....	....	.....	....	.....
Lincoln	a 3	1898	10	36.3	5	8.4	10	5.5	5	....	.....	3	16.5	10	30.8
	b	.....	1	100	1	50	....	.....	0	....	.....	....	.....	1	50
Macon	a 7	1883	10	44.8	7	10.4	10	8.1	7	....	.....	3	6	10	36.6
Madison	a 3	1903	9	33.9	4	7.2	9	7.8	4	....	.....	3	8	9	26.1
McDowell	a	.....	4	52.5	3	4.3	4	5.7	3	....	.....	....	.....	4	46.7
Mecklenburg	a 21	1873	25	41.7	25	8.3	25	7.1	25	....	.....	15	29.5	25	34.5
	b	.....	2	85	2	30	2	30	2	....	.....	....	.....	2	55
Mitchell	a 4	1901	4	38.5	4	4.2	4	4	4	....	.....	1	1	4	34.5
Montgomery	a 5	1891	9	42	6	10.2	9	7.7	6	1	3	3	9	9	34.3
	b 1	1897	1	80	....	.....	1	10	0	....	.....	....	.....	1	70
Moore	a 12	1876	12	35	12	7	11	5.5	11	2	2	7	19.5	12	29.5
Nash	a 3	1876	3	23.7	....	.....	3	6	0	....	.....	....	.....	3	17.7
Orange	a 3	1869	3	38	3	12.3	3	12.3	3	....	.....	....	.....	3	25.7
Person	a 6	1877	9	47.2	9	9.7	9	7.2	9	....	.....	8	22	9	40
Polk	a 8	1900	10	38.8	10	4.1	10	3.5	10	1	1	3	7.5	10	35.3
Randolph	a 5	1884	18	38.5	17	6.1	16	4.1	15	....	.....	11	19.5	18	33.8
Richmond	a 3	1886	3	32.7	3	3.8	3	3.8	3	....	.....	....	.....	3	28.8
Rockingham	a 7	1886	10	38.5	10	4.3	10	3.7	10	....	.....	6	6.5	10	34.8
Rowan	a 14	1894	17	39.8	14	6.9	17	5.3	14	....	.....	8	26.5	17	34.4
	b 1	1904	3	120	....	.....	3	55	0	....	.....	....	.....	3	65
Rutherford	a 17	1889	17	50.9	15	5.9	17	4.4	15	....	.....	12	22	17	46.5
Stanley	a 7	1890	9	36.2	6	6.2	9	4.3	6	....	.....	6	21	9	31.9
	b 1	1909	4	111.7	1	30	4	41.2	1	....	.....	....	.....	4	70.5
Stokes	a 15	1887	17	51.6	6	7	17	5.3	6	....	.....	3	5	17	46.2
Surry	a 9	1887	10	46.5	9	5.7	10	3.7	9	....	.....	5	18.5	10	42.7
Swain	a 3	1900	3	23.3	3	9	2	10.5	2	....	.....	....	.....	3	14.3
Union	a 2	1837	6	41.7	5	15.4	6	9.7	5	....	.....	5	29	6	32
	b 1	1908	1	90	1	75	1	75	1	....	.....	....	.....	1	15
Vance	a 3	1887	3	26.7	2	10.5	3	8.3	2	....	.....	1	2	3	18.3
Wake	a 11	1887	11	31	10	6.2	11	5.9	10	....	.....	3	3	11	25.1
Warren	a 11	1891	12	38.7	11	8.6	12	7.2	11	....	.....	5	16	12	31.4
Watauga	a 3	1905	3	22	....	.....	3	2.3	0	....	.....	....	.....	3	19.7
Wilkes	a 13	1889	16	54.2	13	5.9	16	5.9	13	....	.....	5	10	16	48.3
Yadkin	a 4	1903	8	38	5	4.5	8	4.7	5	1	0.5	3	3	8	33.2
Yancey	a 6	1885	8	31.6	5	6.1	7	4.9	4	....	.....	3	11.5	8	27.1
Total	a 431	1885.9	563	40.0	426	7.0	553	5.9	416	12	15.5	222	589.5	563	34.1
	b 7	1905.3	18	120.4	7	36.0	15	38.5	6	0	0.0	0	0.0	16	61.9
State total	a 549	1885.1	765	34.4	537	6.9	751	6.1	523	31	51.0	257	670.0	765	28.4
	b 22	1903.9	41	134.3	21	100.9	38	92.6	20	0	0.0	1	10.0	39	35.9
Aggregate	571	1885.9	806	.....	558	.....	789	.....	543	31	51.0	258	680.0	804	28.8

PROPORTIONATE DEPTHS—EASTERN.

County.	Cor.	A.	B.	C.	D.	Total.	County.	Cor.	A.	B.	C.	D.	Total.
Camden	1	1	....	....	....	1	Johnson	4	4	6	....	....	10
Beaufort	4	4	5	....	....	9	Jones	1	....	2	2	....	4
Bertie	1	1	2	....	....	3	Lenoir	3	4	3	....	....	7
Bladen	2	1	4	....	....	5	Northampton	3	1	12	....	....	13
Brunswick	2	3	3	....	....	6	Onslow	2	3	2	....	....	5
Cartaret	5	11	2	....	....	13	Pamlico	1	2	....	....	....	2
Chowan	1	4	1	....	....	5	Pasquotank	2	3	1	....	....	4
Columbus	7	13	6	....	....	19	Pitt	4	3	1	....	3	7
Craven	3	2	2	1	....	5	Robeson	3	8	3	....	....	11
Cumberland	7	2	15	1	....	18	Sampson	1	1	2	....	....	3
Dare	1	2	....	....	....	2	Scotland	3	....	11	1	....	12
Duplin	8	14	6	3	....	23	Tyrrell	2	4	2	....	....	6
Edgecombe	4	1	11	....	....	12	Wayne	5	2	7	1	....	10
Greene	2	2	3	....	....	5							
Hertford	2	3	1	....	....	4	29 counties	85	100	113	9	3	225
Hyde	1	1	....	....	....	1	Per cent	....	44.5	50.2	4.0	1.3	....

NORTH CAROLINA—Continued.

PROPORTIONATE DEPTHS—WESTERN.

County.	Col.	A.	B.	C.	D.	Total.	County.	Col.	A.	B.	C.	D.	Total.
Alamance	4	.....	9	2	.....	11	Madison	3	3	2	3	1	9
Alexander	3	1	3	3	.....	7	McDowell	1	.....	1	2	1	4
Alleghany	2	1	3	.....	1	5	Mecklenburg	10	.....	6	21	.....	27
Anson	4	.....	6	5	.....	11	Mitchell	2	.....	2	2	.....	4
Ashe	1	.....	.....	.....	1	1	Montgomery	4	.....	3	6	1	10
Buncombe	8	1	10	7	2	20	Moore	5	.....	5	7	.....	12
Burke	5	.....	2	8	6	16	Nash	2	.....	3	.....	.....	3
Cabarrus	5	.....	10	7	.....	17	Orange	1	.....	2	1	.....	3
Caldwell	5	2	6	6	1	15	Person	3	.....	1	8	.....	9
Caswell	1	.....	2	1	.....	3	Polk	3	.....	6	2	2	10
Catawba	6	.....	7	6	2	15	Randolph	7	.....	8	8	2	18
Chatham	9	1	14	11	.....	26	Richmond	1	.....	2	1	.....	3
Cherokee	2	2	.....	2	.....	4	Rockingham	4	.....	4	6	.....	10
Clay	1	1	.....	1	.....	2	Rowan	7	.....	7	11	2	20
Cleveland	4	.....	3	7	1	11	Rutherford	8	.....	5	8	4	17
Davidson	3	.....	1	4	2	7	Stanly	4	.....	4	6	3	13
Davie	4	.....	5	2	.....	7	Stokes	5	.....	3	9	5	17
Durham	1	.....	2	1	.....	3	Surry	4	.....	3	6	1	10
Forsyth	5	.....	2	8	1	11	Swain	1	1	2	.....	.....	3
Franklin	4	1	5	3	.....	9	Union	3	.....	4	3	.....	7
Gaston	5	.....	7	6	2	15	Vance	1	.....	3	.....	.....	3
Granville	3	.....	6	3	.....	9	Wake	4	.....	8	3	.....	11
Guilford	5	.....	3	8	.....	11	Warren	4	.....	6	6	.....	12
Halifax	3	.....	8	2	.....	10	Watauga	1	.....	3	.....	.....	3
Harnett	5	3	7	2	.....	12	Wilkes	7	.....	3	11	2	16
Haywood	1	.....	3	.....	.....	3	Yadkin	3	.....	3	5	.....	8
Henderson	2	.....	1	2	.....	3	Yancey	4	.....	6	1	1	8
Iredell	6	.....	2	15	1	18							
Lee	3	.....	3	2	1	6	58 counties	219	17	243	273	46	579
Lincoln	3	.....	4	7	.....	11	Per cent	.....	2.9	42.0	47.2	7.9	....
Macon	4	.....	4	6	.....	10							

Reporters' remarks:

Greene County: "Not any noticeable difference in water level; perhaps 12 or 15 inches in the last 25 years." Wayne County: "By ditching the water level has been lowered from 2 to 3 feet." Alamance County: "Two springs and several wells have failed." Caldwell County: "The streams are smaller in volume than they used to be—I think 33 per cent." Chatham County: "Most wells have failed." Cherokee County: "Springs have diminished in flow about 10 per cent in the last 5 years, owing to cutting and removing timber." Davie County: "The water in wells is about 1 foot lower than 20 years ago." Forsyth County: "In 1894 the water sank some 2 feet." Iredell County: "Most of the wells have had to be deepened." "Wells affected by earthquakes in 1886 and 1898." Lincoln County: "Our springs where land has been cleared or a good deal of timber has been cut off are not so strong as they were; a great many springs have gone dry since the land was cleared and creeks are not near so strong as they were 20 years ago." Moore County: "After the land was cleared the springs failed." Rockingham County: "One spring failed about 6 years ago." Rowan County: "About 40 wells are dry and unfit for use; can not tell cause." Rutherford County: "One spring active in 1860 has entirely disappeared." "My spring went dry 15 years ago; do not know the cause." Stanly County: "Creeks and branches frequently go dry." Surry County: "There is a great complaint of wells failing." Swain County: "Creeks and rivers do not contain so much water as they did 10 years ago; some springs have recently failed and we are expecting the springs to further fail when the timber is all taken off." Watauga County: "It seems that the rivers and creeks are gradually drying up." Wilkes County: "Since the land has been cleared a number of springs have dried up and several have partially failed; nearly all the streams have less water than formerly." Yancey County: "The water in wells has greatly diminished; we have had the rainiest season for several years, and when the weather dries up a few days the water in the springs and branches subsides, and one spring has gone dry."

The remarks are consistent with the schedule records for the same counties and districts; these generally show comparatively little change in water level in the eastern part of the State, but a more decided lowering in the elevated western section, especially where the land has recently been cleared. The reporters generally imply recognition of the relation between the water level in their wells and the flow of neighboring springs and streams.

NORTH DAKOTA.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Adams	*a*	19	1908	19	35.1	17	5.6	19	5.5	17	5	4	1	3	19	29.6
	b	5	1908	5	77.2	4	31.2	5	31.8	4	1	2	....	.....	5	45.4
Barnes	*a*	18	1894	24	43.2	23	14.4	24	13.2	23	3	9	10	50	24	30
	b	5	1903	7	231.7	7	152.6	7	150.6	7	1	5	2	19	7	81.1
Benson	*a*	23	1901	23	39.7	19	9.8	23	9.2	19	2	7	9	25	23	30.5
	b	5	1908	5	121.2	5	48	5	45	5	....	.....	1	15	5	76.2
Billings	*a*	8	1908	8	22.4	8	4.5	8	4.2	8	....	.....	1	2.5	8	18.2
	b	7	1909	8	120	8	28.5	8	28.2	8	1	5	2	7	8	91.7
Bottineau	*a*	5	1901	7	28.9	6	9.3	7	5.6	6	....	.....	4	21.5	7	23.2
	b	7	1903	8	117	7	47.6	8	38.5	7	....	.....	2	35	8	78.5
Bowman	*a*	10	1908	17	31.5	16	8.5	16	7.7	15	....	.....	1	2	17	23.6
	b	5	1909	6	129.7	6	48.6	6	48.3	6	....	.....	1	1.5	6	81.3
Burleigh	*a*	12	1900	14	32.9	10	11.3	14	10	10	....	.....	4	20	14	22.9
	b	14	1905	18	116.9	16	77.4	16	65.2	14	....	.....	1	10	18	46.4
Cass	*a*	16	1896	19	33.6	16	11.7	19	9.1	16	....	.....	9	26	19	24.5
	b	15	1901	21	314.7	21	277.6	19	320.7	19	2	10	2	25	21	7.4
Cavalier	*a*	8	1894	11	28.9	10	7.2	11	4.5	10	1	2	9	29	11	24.5
	b	5	1904	7	110.4	5	51	7	58.6	5	....	.....	2	15	7	51.8
Dickey	*a*	10	1895	15	38.3	14	10.3	15	8.8	14	1	2	5	19	15	29.5
	b	..	.....	2	1,025	2	1,025	2	1,025	2	....	.....	....	.....	2	0
Dunn	*a*	13	1906	13	32.4	13	5.2	13	4.4	13	2	3.5	6	13	13	28
	b	2	1908	2	114	2	22.5	2	17.5	2	....	.....	1	10	2	86.5
Eddy	*a*	19	1896	24	23.2	22	6.8	24	4.4	22	....	.....	12	49	24	13.8
	b	1	1902	3	125	3	71.7	3	56	3	....	.....	3	47	3	69
Emmons	*a*	6	1897	13	40.5	7	5.6	13	7.7	7	....	.....	3	6.5	13	32.7
	b	21	1903	24	119.8	21	38.3	19	35.1	16	6	40	2	13	24	80.6
Foster	*a*	5	1901	5	27.8	5	10.5	5	10.5	5	....	.....	....	.....	5	17.3
	b	1	1902	1	112	1	60	1	60	1	....	.....	....	.....	1	52
Grand Forks	*a*	22	1897	26	26.8	22	9	26	6.7	22	....	.....	12	67	26	20.1
	b	2	1887	3	108.3	2	120	3	91	2	....	.....	1	10	3	17.3
Griggs	*a*	6	1901	6	29.5	6	4.1	6	3.5	6	....	.....	3	3.5	6	26
Hettinger	*a*	13	1905	13	33.9	13	8.8	13	8.3	13	2	1	4	8	13	25.7
	b	4	1909	13	105.5	5	31.2	13	34.5	5	....	.....	2	7	13	71
Kidder	*a*	6	1901	7	26.6	6	9.3	7	7.4	6	....	.....	2	7	7	19.1
	b	7	1907	9	175.6	6	57.5	9	63.3	6	....	.....	....	.....	9	112.2
Lamoure	*a*	17	1900	17	41.2	12	11	17	8	12	....	.....	4	35	17	33.2
	b	6	1908	6	156	6	105.2	5	115	5	....	.....	2	16	6	53.5
Logan	*b*	3	1906	3	156.7	3	66.7	3	66.7	3	....	.....	....	.....	3	90
McHenry	*a*	9	1901	10	23.6	10	8.5	9	5.6	9	....	.....	8	33	10	18.4
McKenzie	*a*	7	1908	8	23.2	7	4.8	7	5.2	6	....	.....	1	4	8	18.3
	b	2	1909	4	139.5	1	8	3	49.3	0	....	.....	....	.....	4	100.5
McLean	*a*	18	1902	21	31.8	19	8.5	21	6.5	19	2	3	9	34.5	21	25.3
	b	12	1902	12	91.9	12	31	12	29.4	12	1	15	2	34	12	62.5
Mercer	*a*	5	1908	6	28.7	5	4.8	6	4.8	5	....	.....	....	.....	6	23.8
	b	1	1908	2	120	1	35	2	27.5	1	....	.....	....	.....	2	92.5
Morton	*a*	25	1901	29	37.8	27	12.4	28	11.7	26	1	2	6	14.5	29	26.4
	b	6	1907	8	155.6	6	74.2	6	53.8	4	....	.....	1	2	8	62.7
Mountrail	*a*	14	1905	14	30.4	14	12.4	14	4.8	14	....	.....	9	107	14	25.6
	b	3	1906	3	83	3	21	3	17.7	3	....	.....	2	10	3	65.3
Nelson	*a*	19	1896	24	28.1	23	7.9	22	7.2	21	1	5	5	18	24	21
	b	..	.....	2	77.5	1	6	2	13	1	....	.....	....	.....	2	64.5
Oliver	*a*	8	1906	9	29.4	8	11	9	6.8	8	....	.....	4	28.5	9	22.6
	b	1	1910	2	200.5	1	70	2	60	1	....	.....	....	.....	2	140.5
Pembina	*a*	25	1898	30	24.1	24	5.7	30	5.5	24	2	4	19	50.5	30	18.6
Pierce	*a*	5	1904	5	34.8	5	5.9	5	5.3	5	....	.....	2	3	5	29.5
Ramsey	*a*	28	1898	31	40.2	28	14.6	31	9	28	....	.....	24	146.5	31	31.2
	b	11	1908	13	130.5	9	95	13	88	9	....	.....	2	30	13	42.5
Ransom	*a*	3	1900	3	16.3	....	.....	3	6.3	0	....	.....	....	.....	3	10
	b	1	1907	3	700	3	700	3	700	3	....	.....	....	.....	3	0
Richland	*a*	21	1900	22	25	18	11.6	19	9.3	15	....	.....	10	38.5	22	15
	b	13	1896	15	195.1	15	190.9	15	190.5	15	....	.....	2	7	15	4.6
Rolette	*a*	3	1900	6	25.2	4	10	6	7.8	4	....	.....	3	5	6	17.3
Sargent	*a*	8	1892	8	38.6	6	14.8	6	20	4	....	.....	4	17	8	20.4
	b	12	1904	15	551.3	11	696.4	15	523.3	11	....	.....	1	60	15	28

NORTH DAKOTA—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Sheridan	*a* 7	1905	17	31.5	17	7.4	17	4.9	17	....	.....	11	41.5	17	26.6
	b 5	1905	5	148.6	5	25.2	5	16.8	5	....	.....	4	42	5	131.8
Stark	*a* 17	1903	20	48.9	20	12.6	20	13.5	20	5	23.5	1	4	20	35.3
Steele	*a* 6	1892	6	25.3	6	7.3	6	6	6	....	.....	5	8	6	19.3
Stutsman	*a* 17	1894	20	33	17	9.1	20	7.6	17	1	1	4	18	20	25.4
	b 4	1905	5	193	4	146.2	5	122	4	....	.....	....	.....	5	71
Towner	*a* 6	1900	8	41.5	6	18.3	8	13.1	6	....	.....	3	19	8	28.4
	b 11	1908	11	200.3	8	139.6	11	169.7	8	....	.....	....	.....	11	30.5
Traill	*a* 7	1886	12	36.7	10	9.4	12	5.5	10	....	.....	10	62.5	12	31.3
	b 3	1900	3	254.7	3	254.7	3	254.7	3	....	.....	....	.....	3	0
Walsh	*a* 10	1892	10	24.2	9	11.9	10	6.7	9	....	.....	6	44	10	17.5
	b 11	1902	12	195.4	5	172.2	12	185.2	5	....	.....	....	.....	12	10.2
Ward	*a* 10	1906	12	22.5	10	6.5	12	4.3	10	1	5	7	22	12	18.2
	b 8	1906	9	181.7	9	124.4	9	126.7	9	2	20	....	.....	9	55
Wells	*a* 23	1899	25	26.4	25	11.4	25	10	25	1	1	8	45	25	16.4
	b 5	1907	8	265.6	5	235	7	158.7	4	....	.....	....	.....	8	101.9
Williams	*a* 14	1906	14	37.3	14	12.1	14	11.7	14	1	5	4	11.5	14	25.6
	b 6	1908	6	120.5	5	50	6	58.3	5	....	.....	....	.....	6	62.2
Total	*a* 551	1900.0	651	32.4	577	9.7	640	7.9	566	31	78.0	262	1,162.5	651	24.4
	b 230	1904.6	289	192.2	237	147.0	275	138.5	223	14	97.0	38	415.5	289	55.3
Aggregate	781	1901.3	940	.....	814	.....	915	.....	789	45	175.0	300	1,578.0	940	33.9

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Adams	8	2	10	10	2	....	24	Mountrail	5	2	7	7	....	1	17
Barnes	10	1	13	13	1	3	31	Nelson	9	4	15	6	1	....	26
Benson	9	1	12	10	4	1	28	Oliver	4	4	2	3	1	1	11
Billings	5	2	6	2	3	3	16	Pembina	11	5	21	4	....	....	30
Bottineau	5	1	5	3	5	1	15	Pierce	3	....	2	3	....	....	5
Bowman	8	2	12	3	5	1	23	Ramsey	15	2	14	26	2	....	44
Burleigh	11	2	12	15	3	....	32	Ransom	3	3	3	....	....	....	6
Cass	15	18	15	5	2	....	40	Richland	13	15	21	1	....	....	37
Cavalier	7	....	9	7	2	....	18	Rolette	3	....	6	....	....	....	6
Dickey	5	4	5	7	1	....	17	Sargent	7	12	5	2	3	1	23
Dunn	5	3	5	4	3	....	15	Sheridan	7	1	9	7	1	4	22
Eddy	7	6	14	5	2	....	27	Stark	7	....	12	3	4	1	20
Emmons	11	....	7	19	8	3	37	Steele	2	....	6	....	....	....	6
Foster	2	....	5	1	....	....	6	Stutsman	9	2	12	7	4	....	25
Grand Forks	12	3	21	5	....	....	29	Towner	5	....	12	6	1	....	19
Griggs	2	....	3	3	....	....	6	Traill	6	3	9	1	2	....	15
Hettinger	6	1	11	6	7	1	26	Walsh	8	13	7	2	....	....	22
Kidder	6	4	3	2	3	4	16	Ward	7	4	12	1	2	2	21
Lamoure	8	4	6	10	2	1	23	Wells	10	5	19	3	3	3	33
Logan	1	....	....	....	3	....	3	Williams	7	1	9	7	2	1	20
McHenry	4	1	8	1	....	....	10								
McKenzie	4	3	4	2	1	2	12	45 counties	317	142	420	249	93	36	940
McLean	11	2	14	13	3	1	33								
Mercer	2	1	4	1	1	1	8	Per cent	....	15.1	44.7	26.5	9.9	3.8	....
Morton	12	5	13	13	6	....	37								

Reporters' remarks:

Adams County: "Know but one well to go dry." Barnes County: "Every well running short; several deepened and new ones dug." "Water is getting lower in most of the wells." Benson County: "No appreciable change in water in 24 years." "All wells show a tendency to dry up this year on account of the drought." Billings County: "No wells abandoned for lack of water." Bottineau County: "Some of the shallow wells are dry." "Nearly every farmer has dug the old well deeper or dug a new well." Burleigh County: "Water is about the same as it was 9 years ago." "Nearly all wells seem to be failing." "Springs keep up a steady flow; have done so for 30 years." "A marked decrease in the number of living springs in 25 years." Cass County: "Many dug wells have given out." "Surface wells this summer went dry." "Do not notice any difference of water in 22 years." "Wells are near cultivated timber land and keep the water well." Cavalier County: "Wells

dug by hand 20 years ago are all drying up." Dickey County: "Surface wells in some instances are giving out." Dunn County: "Wells show no variation; numerous springs show no change." Eddy County: "No wells abandoned on account of failure of water." "Some wells have gone dry and some have very little water." "The water level in dug wells since 1883 has gone down about 4 feet; in drilled wells about 20 feet." Emmons County: "Never heard of any change in the water level in wells." "All the wells have an increase of water since they were first made." Grand Forks County: "The very dry season has lowered the water in the wells." "A spring opened up by a gravel cut in the N. P. Railway." "Fifteen years ago there were 20 or 25 feet of water in wells of 40 feet depth; now 4 to 8 feet only." "In 1881 struck water 16 feet from the surface; it is now 18 feet to water level." Griggs County: "Most of the wells have lowered." Hettinger County: "Some wells dry." Kidder County: "Some wells low; the springs are very low on account of dry weather; the lakes are going dry." Mercer County: "Surface wells and springs mostly show a decrease; some dry." Morton County: "A spring did not run this season." "Water the same depth all the year 'round; wet or dry weather does not change it." "No difference in water in wells since they were dug." Mountrail County: "Several shallow wells have failed, owing to awfully dry weather." "Wells have maintained the original supply of water from the time settlers came in 1903." "No appreciable rise or fall in the water level in wells." "Excessive drought caused wells to lower." Nelson County: "In 28 years there has been no material change in the water supply." "The water supply is getting lower all the time." "The wells have furnished more water this year than they did in the drought of 10 years ago." Oliver County: "Original dug wells from 20 to 75 feet have failed; the water level is gradually lowering." Pierce County: "The water in wells is very short on account of drought; some wells nearly dry; those that run short are the shallowest, those that hold out are 35 to 40 feet deep." Ramsey County: "Many wells have had to be deepened or others dug." "Shallow wells were dug about 10 years ago 25 to 60 feet deep; these did not give much water and in a short time dried up." "Water is getting low in most wells; some have gone dry." "Formerly wells at 35 to 50 feet gave a good supply; at present not in sufficient quantities for domestic purposes." "Most dug wells are going dry." "Several shallow wells dug or drilled 20 to 24 years ago are going entirely dry." "Ransom County: "Can find water at 12 to 20 feet; and it has been so for the last 25 years." Rolette County: "Wells extremely low, and creeks have entirely dried up, as have many of the small lakes." Sargent County: "No shallow wells, as they all went dry in the dry years from 1888 to 1897." Sheridan County: "A spring and a slough close by; the spring proper is there as a few years ago, but the slough has about dried up." "Some wells have dried up altogether." "Shallow wells playing out." "All the dug wells from 20 to 100 feet dry, and some springs failing." Stark County: "Wells dug 15 to 25 years ago are as good as ever." Stutsman County: "Three springs partially failing, due to surface water drying up; water stood in big sloughs or ponds; of late years water has evaporated out of them." Towner County: "Wells were all dug, but these have nearly all failed and drilled wells are the only kind we can depend on." "All the shallow wells have gone dry." Traill County: "Wells have been getting lower year by year; many wells are dry." Walsh County: "Surface wells that gave water 25 years ago are drying up—or we may say are all dried up." Ward County: "The shallow wells have all gone dry; the deep wells show no change." "Many shallow wells are failing; springs are drying up from making deep wells." Wells County: "All shallow wells dug in coulees are greatly diminished." Williams County: "No wells have failed."

While the remarks of reporters, even from the same counties, seem more or less incongruous, they are consistent with the schedule records and bring out the local and general variability in the relation

of the subsoil water to the surface. In a general way the lowering of water in wells is more marked in the northeastern half and less noteworthy in the southwestern half of the State; yet everywhere the lowering is more decided beneath the higher lands and frequently imperceptible in low-lying situations. The records clearly show (as some of the remarks indicate) that the mean lowering is greater in drilled than in dug wells, though the difference is evidently due partly to the fact that many dug wells have been deepened or abandoned without record. In some instances the lowering in well water is ascribed to the drought of 1910; but it is noteworthy that other remarks indicate wider relations.

OHIO.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Adams	a	7	1885	16	25.6	11	12.8	16	9.6	11	1	2	7	10	16	15.9
	b			2	90			2	25	0					2	65
Allen	a			1	26	1	16			0					1	10
	b	3	1902	3	102	3	59	3	55	3			2	12	3	47
Ashland	a	7	1875	9	24.1	9	13.9	8	13.1	8			3	7.5	9	11.1
	b	5	1887	6	92.5	5	42	6	39.3	5			2	17	6	53.2
Ashtabula	a	19	1879	24	18.2	22	9.1	24	6.5	22			15	57.5	24	11.7
	b	2	1900	3	80	3	71.7	3	66.7	3			2	15	3	13.3
Athens	a	8	1881	10	38.1	10	15.3	10	12.1	10			7	32	10	26
	b			1	80	1	44			0					1	36
Auglaize	a	10	1872	10	27.7	10	12.3	10	9.7	10			7	26	10	18
	b	4	1899	7	112.9	6	70.8	7	66	6					7	46.9
Belmont	a	15	1863	19	33.4	11	4.6	19	4.5	11			5	10	19	28.8
	b	1	1903	1	104	1	25	1	20	1			1	5	1	84
Brown	a	14	1868	21	21.7	15	7	18	7.1	12			5	20	21	15.2
	b	2	1902	3	68.7	2	40	3	33.3	2					3	35.3
Butler	a	4	1865	10	32.7	6	23.5	10	9.1	6			4	74	10	23.6
Carroll	a	6	1879	6	22.6	6	4.4	6	3.8	6			3	3.5	6	18.7
Champaign	a	10	1873	16	35.7	11	8.3	16	6.3	11			10	34	16	29.4
	b	2	1900	5	76	2	25	5	31	2					5	45
Clark	a	13	1871	16	27.9	12	4.4	16	4.3	12			12	21.5	16	23.6
	b	3	1873	4	100	3	23	4	29.7	3					4	70.2
Clermont	a	6	1870	10	23.3	10	10.8	10	10.3	10			2	5	10	13
	b	2	1901	3	73.3	2	65	3	50	2					3	23.3
Clinton	a	14	1869	20	24.7	18	13.6	20	9.7	18			15	82	20	15
	b	1	1890	2	100			2	62.5	0					2	37.5
Columbiana	a	14	1863	16	25.7	15	8.3	16	5.8	15			11	44.5	16	19.3
	b	3	1906	3	102	3	51.7	3	50	3			1	5	3	52
Coshocton	a	9	1866	14	37.4	8	11.2	14	9.7	8			3	27	14	27.7
	b	1	1890	1	82			1	30	0					1	52
Crawford	a	3	1885	4	37	4	21.2	4	17.2	4			3	16	4	19.7
	b	2	1906	2	66.5	2	27.5	2	22.5	2			1	10	2	44
Cuyahoga	a	13	1879	15	17.9	15	7.5	15	4.9	15			13	38	15	13
	b	5	1899	5	102	5	45	3	23.7	3			1	15	5	60
Darke	a	12	1889	17	25.7	11	12.1	17	11.4	11			4	8	17	14.4
	b	7	1900	9	97.9	7	65.2	6	73.6	4					9	38.9
Defiance	a	1	1873	1	16	1	5	1	5	1					1	11
	b	12	1897	16	95.9	12	70.6	13	57	9			1	20	16	32
Delaware	a	8	1880	10	21.1	8	10.5	10	7.6	8			5	15	10	13.5
	b	3	1901	5	80	3	31.7	3	35	1					5	45
Erie	a	3	1893	3	31.3	3	26.3	3	17.7	3			3	26	3	13.7
Fairfield	a	3	1894	6	26.7	4	8.2	6	5.8	4			3	8	6	19.8
	b			2	76.5	1	60	2	55	1					2	21.5
Fayette	a	4	1882	9	23.2	4	9.5	9	10.2	4					9	13
	b			6	95			6	47.5	0					6	47.5
Franklin	a	8	1852	10	20.6	10	7.5	10	3.7	10			8	36	10	16.9
	b	2	1905	4	78.7			4	37.5	0					4	41.2
Fulton	a	4	1896	4	26.7	2	6.5	4	13	2					4	13.7
	b	8	1891	8	112.9	6	79.7	8	53.5	6			3	80	8	59.4
Gallia	a	19	1878	31	27.3	29	12.7	31	8	29			24	124	31	19.3
	b	2	1880	2	72.5	2	12	2	12	2					2	60.5
Greene	a	11	1890	13	33.7	12	17.2	13	14.2	12			7	25	13	19.5
	b	1	1910	1	84	1	54			0					1	30
Guernsey	a	8	1876	8	29.6	5	10.4	8	9.7	5	1	5	2	2.5	8	19.9
	b	3	1900	3	74.3	1	40	3	26.7	1	1	5			3	47.7
Hamilton	a	20	1859	22	28.5	17	6	22	4.3	17			11	28	22	24.3
	b	1	1905	1	60			1	45	0					1	15
Hancock	a	2	1892	2	36.5	2	29	2	25	2			1	8	2	11.5

OHIO—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Hardin	a	5	1891	5	42	4	23.5	5	20.4	4			4	18	5	21.7
	b	7	1895	9	65.1	8	43.5	7	42.9	6			3	43	9	24.6
Harrison	a	3	1870	5	29	3	12.3	5	8.2	3			3	8	5	20.8
	b			1	100			1	40	0					1	60
Henry	b	8	1891	9	66	7	40	9	42.6	7			2	13	9	23.4
Highland	a	15	1889	17	27.1	14	9.6	17	8.1	14	3	4	5	24	17	19
Hocking	a	6	1872	6	32	4	4	6	4.5	4					6	27.5
Holmes	a	4	1872	4	31.5	4	13.5	2	17.5	2			1	5	4	19.2
	b	3	1905	3	185	3	56.7	2	55	2			1	20	3	135
Huron	a	8	1896	11	25.1	11	7.6	11	6.3	11			6	15	11	18.8
	b	2	1906	2	87.5	2	30	2	17.5	2			1	25	2	70
Jackson	a	10	1883	12	26.1	10	7.4	12	6.2	10			3	8	12	19.9
Jefferson	a	5	1886	5	38	5	6.2	5	4.2	5			5	10	5	33.8
	b	1	1883	1	64	1	15	1	15	1					1	49
Knox	a	8	1861	13	25.2	13	11.4	11	7.7	11			8	29	13	17.5
	b	6	1892	8	110.2	8	57.7	2	22.5	2			1	10	8	53.7
Lake	a	6	1871	13	22.7	5	2.4	13	3.8	5			1	1	13	18.9
	b			1	60			1	15	0					1	45
Lawrence	a	3	1883	14	25.5	12	9.2	11	7	9			7	34	14	18.9
	b	3	1886	3	70.7			3	15	0					3	55.7
Licking	a	6	1887	13	24.5	11	8.6	13	7.2	11			5	15	13	17.3
	b	5	1902	5	131.2	5	77.5	5	77.5	5					5	53.7
Logan	a	5	1879	5	25.1	3	10	5	7.8	3			2	10	5	17.3
	b	10	1902	11	76	10	53.4	11	57.5	10					11	18.5
Lorain	a			3	19.3	1	10	3	8.3	1					3	11
Lucas	a	3	1883	3	13.7	3	7.9	3	4.2	3			3	11	3	9.5
	b	8	1890	8	70.7	5	43.4	8	33.9	5			2	12	8	36.9
Madison	a	7	1879	14	25.6	9	8.4	12	8	7			5	20	14	17.7
	b	4	1899	5	97	4	63.7	5	67	4					5	30
Mahoning	a	5	1848	6	18.3	5	8.8	6	7.8	5			1	4	6	10.5
	b	3	1904	3	70.7	3	41.3	3	34.7	3			2	20	3	36
Marion	a	4	1880	4	20.7	4	10.2	3	9	3			2	4	4	11.5
	b	3	1876	8	64.6	5	47.6	8	46	5					8	18.6
Medina	a	7	1870	7	17.3	7	8	7	5.4	7			4	18	7	11.9
	b	8	1899	8	82.4	5	39	8	34.1	5					8	48.2
Meigs	a	7	1873	10	22.1	8	6.9	10	6.9	8	1	2	3	18	10	15.2
Mercer	a	4	1892	4	27.2	4	16.7	3	16	3			2	2	4	11
	b	16	1902	18	105.4	12	68.1	16	65.1	10			2	15	18	40.3
Miami	a	12	1869	13	23.9	11	8	13	7	11			7	20	13	17
	b	1	1907	3	85.7	1	40	3	38.3	1			1	30	3	45.3
Monroe	a	9	1866	9	41.1	8	10	9	16.9	8			7	27.5	9	24.2
	b	1	1885	1	80	1	18	1	10	1			1	8	1	70
Montgomery	a	10	1878	10	19.1	10	9.3	10	7.1	10			8	22	10	12
	b	1	1900	1	200	1	194	1	190	1			1	4	1	10
Morgan	a	13	1848	17	40.5	17	12.9	17	8.2	17			10	80	17	32.3
Morrow	a	16	1869	17	27.7	17	8.9	17	7.6	17			7	23	17	20.1
Muskingum	a	8	1855	14	34	6	12.8	14	7.5	6			2	23	14	26.5
Noble	a	9	1867	12	44.4	12	10.2	9	6.1	9			5	40	12	37.5
Ottawa	a	6	1889	10	27.8	9	12.6	10	12.2	9			6	16	10	15.6
	b	6	1897	9	63.8	6	42.2	9	43.8	6			3	5	9	19.9
Paulding	a	19	1894	19	38.3	18	22.4	18	19.8	17			10	57	19	18.4
	b	6	1900	9	77.6	5	69	8	62	4					9	16.9
Perry	a	9	1890	9	28.6	9	11.3	9	11.3	9	1	4	2	4	9	17.2
	b	3	1895	3	78.3	2	25	3	28	2			1	6	3	50.3
Pickaway	a	5	1876	11	20.4	5	5.4	11	4.2	5			2	7	11	16.2
	b	1	1903	3	119			3	60	0					3	59
Pike	a	9	1838	9	20.4	9	9.2	9	6.4	9			6	25	9	14.1
Portage	a	10	1855	10	24.4	10	9.6	10	5.2	10			6	43.5	10	19.1
	b	7	1890	9	98	4	43	8	53.5	3			2	10	9	43.8
Preble	a	16	1876	22	24	16	10.1	22	6.8	16			11	50.5	22	17.3
	b	3	1901	4	108.2	3	64	4	63	3					4	45.2
Putnam	a	6	1888	6	33.3	6	17	6	17	6					6	16.3
	b	10	1896	11	95	8	54.4	8	72.4	5					11	27.5
Richland	a	3	1867	3	21.7	2	4.7	3	3.7	2			2	2.5	3	18
	b	4	1904	4	120.5	4	51.7	4	51.7	4					4	68.7
Ross	a	8	1878	8	26.1	8	3.4	8	2.6	8			3	6.5	8	23.6
	b	3	1907	3	126.7	3	92.3	1	52	1					3	34.3
Sandusky	a	3	1887	3	18.3	3	12.3	3	2.3	3			3	30	3	16
	b	5	1886	5	108.2	2	62.5	5	88	2			1	5	5	20.2
Scioto	a	13	1864	15	29.5	14	10.4	15	7.5	14			5	38	15	22
Seneca	a	14	1871	15	29.9	9	15.8	15	17.1	9			5	16	15	12.8
	b	11	1901	11	73.7	8	38.2	11	44.7	8	1	4	3	24	11	29
Shelby	a	2	1901	4	32.2	4	15.2	2	1	2			2	8	4	19
	b	1	1906	3	100	1	60	2	45	0					3	50
Stark	a	6	1865	7	32.9	7	4.9	7	2.3	7			7	18	7	30.6
	b	2	1910	5	133	4	53.7	1	40	0					5	82
Summit	a	6	1859	8	28.5	6	15.9	8	11.9	6			3	7.5	8	16.6
	b	5	1897	5	99	5	48.4	5	48	5			1	2	5	51
Trumbull	a	17	1875	19	20.3	16	8.7	19	7	16			11	46	19	13.3
	b			2	150			2	75	0					2	75

OHIO—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Tuscarawas	*a* 15	1876	15	29.4	14	7.5	15	6.3	14	....	.....	8	13.5	15	23.1
	b 8	1894	8	81.2	8	31.4	5	24.2	5	....	.....	2	28	8	53.4
Union	*a* 6	1861	7	23.1	5	6.6	6	6.5	4	....	.....	3	5	7	17.3
	b 2	1897	3	83.3	1	35	3	49.7	1	....	.....	....	.....	3	33.7
Van Wert	*a* 1	1872	3	36.7	1	15	3	13	1	....	.....	1	5	3	23.7
	b 1	1900	1	76	1	50	1	50	1	....	.....	....	.....	1	26
Vinton	*a* 7	1856	7	23.7	7	10.3	7	9	7	....	.....	3	9	7	14.7
	b 1	1907	2	177.5	1	168	2	169	1	....	.....	....	.....	2	8.5
Warren	*a* 5	1887	9	19.6	4	9	9	5.4	4	....	.....	3	8	9	14.1
	b 2	1906	4	78	2	55	4	41.2	2	....	.....	1	5	4	36.7
Washington	*a* 20	1850	22	32.2	19	8.1	20	5.9	17	1	1	6	18	22	24.9
	b 3	1907	5	92.4	3	75.3	4	61.5	2	....	.....	....	.....	5	37.2
Wayne	*a* 4	1861	6	22.5	5	9	6	5.1	5	....	.....	3	17.5	6	17.4
	b 4	1900	5	86.4	4	70	5	62	4	....	.....	....	.....	5	24.4
Williams	*a* 1	1875	1	35	1	10	....	.....	0	....	.....	....	.....	1	25
	b 2	1875	5	110	1	15	4	122.5	0	....	.....	....	.....	5	9
Wood	*a* 13	1887	15	27.9	13	15.8	14	15.4	12	....	.....	8	22	15	12
Wyandot	*a* 3	1886	5	27.8	3	20.7	5	17.4	3	....	.....	....	.....	5	10.4
	b 1	1905	1	120	1	80	1	80	1	....	.....	....	.....	1	40
Total	*a* 700	1873.5	907	27.4	746	10.6	880	8.1	719	8	18.0	428	1,752.0	907	19.2
	b 256	1897.2	336	92.1	229	54.0	296	51.6	189	2	9.0	45	464.0	336	40.0
Aggregate	956	1879.8	1,243	.....	975	.....	1,176	.....	908	10	27.0	473	2,216.0	1,243	24.8

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Adams	6	2	14	1	1	....	18	Lucas	4	2	6	....	3	....	11
Allen	2	....	1	3	....	....	4	Madison	5	1	15	3	....	....	19
Ashland	5	5	5	3	1	1	15	Mahoning	3	3	5	1	....	....	9
Ashtabula	9	12	14	1	....	....	27	Marion	4	3	8	1	....	....	12
Athens	4	2	4	5	....	....	11	Medina	5	2	9	1	3	....	15
Auglaize	6	1	9	5	2	....	17	Meigs	4	4	6	....	....	....	10
Belmont	8	2	9	7	2	....	20	Mercer	8	4	6	10	2	....	22
Brown	9	7	14	3	....	....	24	Miami	7	....	14	2	....	....	16
Butler	4	1	7	2	....	....	10	Monroe	4	1	4	4	1	....	10
Carroll	2	....	6	....	....	....	6	Montgomery	4	1	10	....	....	....	11
Champaign	5	1	11	8	1	....	21	Morgan	7	....	9	8	....	....	17
Clark	6	1	10	7	2	....	20	Morrow	6	3	12	2	....	....	17
Clermont	5	....	12	1	....	....	13	Muskingum	6	1	8	5	....	....	14
Clinton	8	6	14	1	1	....	22	Noble	4	1	4	5	1	1	12
Columbiana	7	1	13	3	2	....	19	Ottawa	6	5	11	3	....	....	19
Coshocton	6	....	10	5	....	....	15	Paulding	11	10	12	6	....	....	28
Crawford	2	....	4	2	....	....	6	Perry	5	1	6	5	....	....	12
Cuyahoga	7	4	12	2	2	....	20	Pickaway	5	4	6	3	1	....	14
Darke	8	4	17	1	4	....	26	Pike	3	5	3	1	....	....	9
Defiance	6	....	12	3	2	....	17	Portage	7	3	10	3	3	....	19
Delaware	5	4	6	5	....	....	15	Preble	9	3	18	5	....	....	26
Erie	1	1	2	....	....	....	3	Putnam	6	....	15	2	....	....	17
Fairfield	4	1	6	1	....	....	8	Richland	2	1	3	....	3	....	7
Fayette	4	2	9	3	1	....	15	Ross	3	....	9	....	2	....	11
Franklin	4	2	9	3	....	....	14	Sandusky	4	....	8	....	....	....	8
Fulton	5	1	8	1	....	2	12	Scioto	6	2	11	1	1	....	15
Gallia	11	11	15	6	1	....	33	Seneca	10	7	13	6	....	....	26
Greene	4	2	12	....	....	....	14	Shelby	2	....	5	1	1	....	7
Guernsey	4	1	7	3	....	....	11	Stark	4	....	4	4	3	1	12
Hamilton	8	2	15	6	....	....	23	Summit	5	1	7	4	1	....	13
Hancock	2	....	2	....	....	....	2	Trumbull	7	4	15	1	1	....	21
Hardin	6	1	9	4	....	....	14	Tuscarawas	8	2	10	10	....	1	23
Harrison	3	....	4	2	....	....	6	Union	4	....	8	2	....	....	10
Henry	5	1	7	1	....	....	9	Van Wert	2	1	2	1	....	....	4
Highland	6	3	12	2	....	....	17	Vinton	3	1	8	....	....	....	9
Hocking	3	....	4	2	....	....	6	Warren	4	3	7	3	....	....	13
Holmes	3	1	3	....	1	2	7	Washington	10	2	17	6	2	....	27
Huron	5	1	8	3	1	....	13	Wayne	4	2	6	3	....	....	11
Jackson	4	1	9	2	....	....	12	Williams	1	4	1	1	....	....	6
Jefferson	2	....	2	4	....	....	6	Wood	2	5	10	....	....	....	15
Knox	6	2	11	6	2	....	21	Wyandot	2	2	3	1	....	....	6
Lake	5	2	10	2	....	....	14								
Lawrence	7	2	11	4	....	....	17	87 counties	446	190	749	239	57	8	1,243
Licking	7	4	9	2	3	....	18	Per cent	....	15.3	60.3	19.2	4.6	0.6	....
Logan	6	1	15	....	....	....	16								
Lorain	1	1	2	....	....	....	3								

Reporters' remarks:

Ashland County: "Springs fail." Ashtabula County: "Dug wells are being replaced by drilled wells since the dense forests have been cut." "Many springs have failed and in others the supply has been greatly reduced; this is due to the reckless cutting of the timber." Athens County: "Some springs and wells have failed." Belmont County: "Coal mining affects wells and springs." Champaign County: "The water level is getting lower as forests are removed and the ground is being cultivated." "This township was noted for springs, but the deepening of the streams has put them all dry." "The older wells are failing and new ones are being put down from 50 to 80 feet." Clark County: "Have a few surface wells, but they are dry about half the time." "Very many, perhaps hundreds of springs have gone dry in the last 25 years; tiling has dried many." Clermont County: "Springs once numerous about streams have failed generally." "We used to count on an abundant water supply from dug wells and springs; now only about 25 per cent of them can be relied on; we have had to substitute drilled wells." Clinton County: "The water level has fallen some 3 feet in 50 years." Crawford County: "An epidemic of typhoid led a township board of health to condemn dug wells and order all wells drilled in rock; when the typhoid disappeared." Darke County: "Springs not as strong as formerly; some have been abandoned." Defiance County: "In general water stands lower than 20 or 30 years ago." Delaware County: "Wells that 30 years ago were good at present are worthless in dry seasons." Franklin County: "The old dug wells are of but little use, as they soon give out." "Water seems to be becoming less plentiful in recent years." Fulton County: "Factories using large quantities of water have lowered wells." Gallia County: "The supply of water is failing yearly." "While some springs have failed, others came that have held out very well." "Water in most wells has lowered in the last 25 years." Guernsey County: "A spring started 3 years ago." Hamilton County: "Two springs failed in the last 10 years." "Three springs have dried up and failed, and one started." "All the old wells have failed." Hancock County: "Lowering of wells and failure of springs ascribed to city water works supplied from large wells." "Only a few dug wells left." Hardin County: "Dug wells principally abandoned." Henry County: "In an early day we had surface wells; in dry weather they went dry." "Surface wells mostly abandoned." Holmes County: "Several springs have failed." Huron County: "Have drilled three wells deeper in the last 5 years with good success." Jefferson County: "The water is getting lower each year; wells of 30 feet are not as good now as wells of 25 feet were 30 years ago; springs the same way; elevated ones are soon weak when dry weather sets in; low springs have not changed noticeably in two or three decades." Lake County: "Nearly all wells put down when the country was settled (1805–1820) are still useful; a spring burst out after a severe thunder storm in the late sixties and still flows." Licking County: "Springs never without an abundance of water a few years ago are now dry, could write a long chapter on this drying of springs." "A lot of wells went dry 2 years ago when a mill dam went out." Logan County: "One spring is dry on account of four wells being drilled within a half mile." "Some of the springs have gone dry since so much of the timber has been cut and the land drained." "Flowing wells have failed." Lucas County: "The failure of water has been caused by clearing the land and digging large ditches." "The first settlers got water from dug wells; as the forest was cleared away these wells went dry and there was only one way to get water; that was by drilling to or into the bed rock." Madison County: "Early wells mostly giving out; water table is settling and some springs giving out." Mercer County: "Dug wells are almost all abandoned." "The water does not rise quite so high as it did years ago, though the supply seems to be inexhaustible." Miami County: "Some springs scarcely running at all; large ditches possibly account for it." Montgomery County: "A few years ago Brookville began to drill wells and all the springs became

perfectly dry." "Water lowering all the time." Morrow County: "Water level has sunk about 2 feet in the last 50 years." Muskingum County: "Some springs weakening." Ottawa County: "Dug wells are not much account." Paulding County: "Many years ago water was easily obtained, but now the average depth for digging or drilling is 42 to 51 feet." "All wells seem to deteriorate and the best will in time fail." Pike County: A well "supposed to be put down by the use of quicksilver." "Since surface water has been drained the water in wells does not remain after the wet season is over." Portage County: "Formerly wells were dug and found water at 10 to 15 feet; later these failed and were dug to about 22 or 24 feet and found a good supply, but several have partially failed, and have been drilled to 50 to 125 feet, finding water that would nearly or quite overflow." "A spring broke out during this dry weather." "Many springs are dry, and the larger and better are not so strong as formerly." Preble County: "The lowering of the level of water has been a matter of remark all over this county." "Most all dug wells have had to be made deeper." Putnam County: "Only a few shallow wells in use any more, and the water supply for them has been considerably lessened." Ross County: "All old wells have been deepened from 3 to 6 feet in the last 30 years; attributed to clearing up of timber land." Scioto County: "The steady supply of water is in part at least due to the increase of forests as there is more forest land today than there was 20 years ago." Seneca County: "The railroad well drains neighboring wells in a dry season." Shelby County: "Excellent springs abounding 17 or 18 years ago in most cases have entirely failed; wells formerly averaged 20 to 30 feet, but with the clearing of the timber they all have mostly failed; we now have drilled wells from 60 to 140 feet." Stark County: "Wells deepened; two dug wells abandoned; owners have had to drill to get water." "Nearly all old dug wells abandoned on account of little water and the same being contaminated." Trumbull County: "The water level is about 1½ feet lower than 25 years ago and slowly receding." Union County: "The dug wells have all failed." Warren County: "Springs are failing rapidly and quite a number are out of existence; the water is decreasing in the wells—quite a perceptible amount in 5 or 10 years." "Wells have been abandoned." Wayne County: "Only the shallow dug wells show signs of failure." Wood County: "Quite a number of dug wells have gone dry; all new wells are drilled." "About all the old dug wells have given out."

Many of the Ohio reporters (including several of those quoted) clearly recognize the relation between wells, springs, and streams, and some of them bring out the interdependence between general water supply and those modern industrial developments in which water is used more lavishly than under ordinary rural conditions. As usual, the soundness of the opinions expressed concerning changes in water level is established by the records; indeed, the chief service of the remarks is to illustrate the records in the light of the living issues raised by the figures and frequently felt by the reporters.

OKLAHOMA.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Adair	a	1	1900	1	40	1	11	1	10	1			1	1	1	30
	b	2	1900	2	83.5			2	47.5	0					2	36
Alfalfa	a	10	1896	12	23.7	7	6.9	12	7.6	7	2	4	1	2	12	16.1
	b	1	1903	1	80	1	8	1	5	1			1	3	1	75
Beaver	a	2	1906	4	25.5	2	6	3	5.3	1	1	1			4	20.2
	b	14	1906	15	160	11	10.8	15	18.3	11			3	12	15	141.7
Beckham	a	11	1901	12	25.2	8	6.2	12	4.6	8	1	15	5	22	12	20.7
	b	4	1904	5	94.4	4	20	5	18.8	4	1	25	1	26	5	75.6
Blaine	a	1	1900	4	36.2	1	8	4	6.5	1					4	29.7
	b	2	1902	2	70	2	30	2	30	2					2	40
Bryan	a	7	1901	7	35.1	7	9.1	7	7.3	7			3	13	7	27.9
	b	8	1906	8	108	8	30.7	8	30.4	8	1	9	2	12	8	77.6
Caddo	a	8	1905	10	26.2	9	11.1	10	9.1	9	1	2	3	17	10	17.1
	b	11	1905	15	101.5	13	27.3	15	27.7	13	2	25	2	4	15	73.8
Canadian	a	9	1894	9	42.8	9	9.1	9	9.1	9					9	33.7
Carter	a	6	1902	6	38.3	5	6.2	6	3.7	5			2	13	6	34.7
	b	1	1892	2	90	1	8	2	23.5	1			1	1	2	66.5
Cherokee	a	12	1897	12	36.2	12	10.4	12	6.8	12			8	43	12	29.4
	b	3	1905	3	101.7	3	17	3	17	3					3	84.7
Cimarron	b	13	1908	15	209.9	13	27.9	12	25	10	1	2			15	182.3
Cleveland	a	4	1896	6	41.7	4	9.2	6	10.2	4	2	22	1	5	6	31.5
	b	5	1904	6	90.2	5	24.2	6	41.2	5	2	76			6	49.1
Coal	a	2	1898	3	27.7	2	8	3	5.7	2			1	5	3	22
Comanche	a	20	1904	22	29.6	18	9.4	22	6.4	18	2	6	13	58.5	22	23.2
	b	2	1902	2	82	2	5.5	2	2.5	2			2	6	2	79.5
Craig	a	5	1899	5	28.2	5	8.8	5	4.4	5			4	22	5	23.8
	b	1	1907	1	110	1	40	1	20	1			1	20	1	90
Creek	a	5	1905	6	30.5	5	14	6	12.5	5					6	18
	b	5	1907	9	155.6	8	123.6	9	113.2	8					9	42.3
Custer	a	7	1899	10	28.7	7	7	10	7.8	7	4	19	1	2	10	20.9
	b	5	1904	6	111.7	2	16.5	6	31.5	2			2	2	6	80.2
Delaware	a			1	40			1	20	0					1	20
	b	7	1907	7	110.1	4	44.5	7	49.6	4	1	3	1	4	7	60.6
Dewey	a	9	1897	9	46.2	8	4.4	9	9.4	8	5	45	1	1	9	36.8
	b	18	1901	18	126.5	13	36.1	18	29.8	13	1	10	2	13	18	96.5
Ellis	a	5	1906	5	44	5	17	5	17	5					5	27
	b	4	1905	5	145.8	4	118	5	101.4	4					5	44.4
Garfield	a	5	1899	9	27.2	5	10.8	9	9.9	5	1	17			9	17.3
Garvin	a	6	1899	7	31.6	6	8.9	7	7.9	6			1	8	7	23.6
	b			1	100			1	10	0					1	90
Grady	a	7	1903	14	32.9	12	6.3	14	5.7	12			3	13	14	27.2
	b	6	1905	6	78.3	3	30	6	9	3			2	65	6	69.3
Grant	a	15	1899	19	20.2	11	5.4	19	6.3	11			3	7	19	13.9
Greer	a	5	1902	10	19.9	7	10.9	10	7.7	7			4	8	10	12.2
	b			1	200			1	50	0					1	150
Harmon	a	7	1899	7	29.4	6	8.7	7	13	6	4	34			7	16.4
	b	8	1903	8	153.9	6	69.3	8	73.9	6	2	15			8	80
Harper	a	3	1905	6	30	6	12.3	6	15.3	6	3	18			6	14.7
	b	2	1902	3	114.3	2	17.5	3	20	2	1	5			3	94.3
Haskell	a	1	1910	2	38.5	1	3	2	5.5	1	1	3			2	33
	b	3	1907	4	83	3	55	4	49.7	3	2	15			4	33.2
Hughes	a	4	1904	9	36.6	4	22.7	9	12.3	4			1	6	9	24.2
	b	5	1906	6	105	5	35	6	32.5	5			1	10	6	72.5
Jackson	a	21	1898	22	29.4	21	8.4	22	9.2	21	8	41	9	27.5	22	20.2
	b	2	1905	3	88.7	2	20	3	13.3	2			1	20	3	75.3
Jefferson	a			1	30			1	6	0					1	24
	b			2	83	1	30	1	20	0					2	58
Johnston	a	3	1909	3	24.3	3	10.3	3	7.3	3			2	9	3	17
Kay	a	18	1896	23	30.1	18	9.6	23	7.4	18	1	18	10	52	23	22.7
	b	2	1895	2	100	2	37.5	2	37.5	2					2	62.5
Kingfisher	a	13	1892	17	35.4	14	8.5	17	10.4	14	4	33	3	8	17	25
	b	2	1899	4	84.2	1	40	4	25.2	1	1	13			4	59
Kiowa	a	15	1902	16	25.1	13	6.3	16	7.3	13	1	23	7	25	16	17.7
Latimer	a	10	1894	10	33	8	8.5	10	4.2	8			8	46	10	28.8
	b	2	1900	2	82.5	2	25	1	0	1			1	20	2	67.5
Lincoln	a	19	1898	21	42.2	15	11.1	21	10.7	15	2	7	6	15.5	21	31.5
	b	12	1900	12	97.8	12	37.9	12	35.7	12			4	26	12	62.1
Logan	a	7	1897	8	28.7	8	7	8	5.4	8			4	12.5	8	23.3
	b	2	1907	4	63.5	4	22	4	19.5	4			2	10	4	44
Love	a	5	1898	5	54.4	5	5.1	5	4.6	5	1	1	3	3.5	5	49.8
	b	1	1898	1	160	1	35	1	20	1			1	15	1	140
Major	a	4	1906	5	34.2	5	8	5	8.9	5	3	5	1	0.5	5	25.3
	b	3	1901	3	102.3	3	24.7	3	24.7	3					3	77.7
Marshall	a	4	1910	4	45.5	1	4	4	7.2	1			1	2	4	38.2
Mayes	a	10	1900	11	27.2	10	12.1	11	10.4	10			2	12	11	16.8
	b	2	1909	3	190.7	3	165	3	162.7	3			2	7	3	28

OKLAHOMA—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
McClain	a	7	1907	7	35.1	7	15.4	7	11.1	7	....	.....	5	30	7	24
	b	5	1908	5	71	5	33.6	5	24.2	5	....	.....	3	47	5	46.8
McIntosh	a	8	1903	11	31	11	10.9	11	5.3	11	....	.....	8	61.5	11	25.7
	b	1	1904	1	90	1	12	1	10	1	....	.....	1	2	1	80
Murray	a	3	1904	3	28.7	3	8	3	1.3	3	....	.....	3	20	3	27.3
Muskogee	a	1	1906	7	29.7	3	10	7	10.5	3	....	.....	3	5.5	7	19.2
Noble	a	7	1897	7	40.1	6	11.5	7	17.8	6	3	54	3	10	7	22.4
Nowata	a	1	1902	1	38	1	30	1	20	1	....	.....	1	10	1	18
	b	2	1892	2	62.5	2	47.5	2	17.5	2	....	.....	2	60	2	45
Okfuskee	a		.....	7	46	3	7.7	7	5.6	3	....	.....	3	11	7	40.4
Oklahoma	a	13	1894	15	38.8	11	10	15	8.3	11	1	1	8	20.5	15	30.5
	b	11	1899	11	97.5	11	42.4	11	42	11	....	.....	2	4	11	55.5
Okmulgee	a	6	1903	6	27.4	6	8.4	5	7.6	5	....	.....	2	2.5	6	19.4
Osage	a	5	1901	6	36.3	6	16.3	6	16	6	....	.....	1	2	6	20.3
Ottawa	a	1	1885	1	12	1	4	1	4	1	....	.....	....	.....	1	8
	b	2	1906	2	210	2	155	2	155	2	....	.....	....	.....	2	55
Pawnee	a	9	1898	11	29.6	8	12.1	11	7.5	8	1	0.5	3	30	11	22.2
	b	6	1898	8	91.1	4	33	8	35	4	....	.....	2	12	8	56.1
Payne	a	3	1894	3	33.3	3	14	3	16	3	1	6	....	.....	3	17.3
	b	5	1902	6	90.2	6	37.8	6	38.3	6	1	15	1	12	6	51.8
Pittsburg	a	3	1908	6	27.7	4	11.7	6	10.3	4	....	.....	1	4	6	17.3
	b	3	1908	3	68	3	24	3	24	3	....	.....	....	.....	3	44
Pontotoc	a	8	1902	9	26.8	8	9.1	9	5.6	8	....	.....	3	26	9	21.2
	b	3	1900	3	88.7	3	21.7	3	16.7	3	....	.....	1	15	3	72
Pottawatomie	a	8	1898	8	30.7	6	14.9	8	13.3	6	....	.....	2	6	8	17.4
	b	12	1901	12	82.5	11	28.4	12	37.5	11	2	98	....	.....	12	45
Pushmataha	a	6	1907	13	29.3	11	9	13	5.7	11	....	.....	4	31	13	23.6
Roger Mills	a	7	1904	7	38.4	7	8.4	7	11	7	4	28	1	10	7	27.4
	b	7	1905	7	135.7	7	39.4	7	43.7	7	2	30	....	.....	7	92
Rogers	a	8	1894	8	38.1	8	19.2	8	14.2	8	3	9	3	49	8	23.9
	b	1	1894	3	103.3	1	70	3	58.3	1	....	.....	....	.....	3	45
Seminole	a	3	1903	5	37.4	3	21	5	15.6	3	2	3	....	.....	5	21.8
	b	6	1903	7	137.3	6	40	7	42.7	6	3	51	2	20	7	94.6
Sequoyah	a	3	1902	6	38	4	14	6	13.5	4	....	.....	....	.....	6	24.5
	b	1	1904	2	76.5	1	25	2	27.5	1	....	.....	....	.....	2	49
Stephens	a	4	1898	5	35	4	10	5	8.6	4	....	.....	....	.....	5	26.4
	b	6	1908	6	97.2	6	45.2	6	45.2	6	....	.....	....	.....	6	52
Texas	a	1	1897	6	25.8	3	12.8	6	8.8	3	1	2.5	2	16	6	17
	b	13	1906	20	172.4	15	55.3	18	34.4	13	....	.....	2	221	20	135.3
Tillman	a	8	1904	8	21.2	8	4.8	8	3.3	8	1	3.5	7	15.5	8	17.9
Tulsa	a	3	1908	6	28	6	6.3	6	4.3	6	....	.....	3	12	6	23.7
Wagoner	a	5	1904	8	42.1	8	20.4	8	10.7	8	....	.....	5	77	8	31.4
Washington	a	6	1895	6	24.2	6	10.8	6	6.2	6	....	.....	3	28	6	18
Washita	a	13	1901	18	30.7	12	6.9	18	6.9	12	6	18.5	2	5	18	23.8
	b	3	1893	3	152	....	.....	3	111.7	0	....	.....	....	.....	3	40.3
Woods	a	5	1905	7	26.7	3	13.3	7	11.4	3	....	.....	....	.....	7	15.3
	b	1	1906	2	64.5	2	35	2	25	2	....	.....	2	20	2	39.5
Woodward	a	7	1905	8	36.1	7	13.3	8	12	7	1	1	....	.....	8	24.1
	b	4	1905	6	114.5	4	23.7	6	25.3	4	....	.....	2	3	6	89.2
Total	a	468	1900.0	592	32.0	471	9.9	590	8.6	469	71	441.0	188	942.5	592	23.4
	b	250	1903.2	296	119.3	235	40.9	289	38.1	228	23	392.0	52	692.0	296	80.4
Aggregate		718	1901.1	888	.....	706	.....	879	.....	697	94	833.0	240	1,634.5	888	42.4

OKLAHOMA—Continued.

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Adair	1	....	2	1	....	....	3	Love	2	....	....	5	....	1	6
Alfalfa	5	....	12	....	1	....	13	Major	3	1	3	2	2	....	8
Beaver	7	2	1	2	2	12	19	Marshall	1	....	1	3	....	....	4
Beckham	6	1	9	4	2	1	17	Mayes	5	3	9	2	....	....	14
Blaine	2	....	3	3	....	....	6	McClain	4	1	4	6	1	....	12
Bryan	5	....	4	8	2	1	15	McIntosh	3	3	4	3	2	....	12
Caddo	8	2	9	4	6	4	25	Murray	1	....	2	1	....	....	3
Canadian	3	....	3	6	....	....	9	Muskogee	2	1	5	1	....	....	7
Carter	3	....	2	5	1	....	8	Noble	3	....	5	2	....	....	7
Cherokee	5	1	6	5	2	1	15	Nowata	1	....	1	2	....	....	3
Cimarron	5	....	....	....	2	13	15	Okfuskee	2	....	2	4	1	....	7
Cleveland	4	2	2	5	3	....	12	Oklahoma	9	....	14	6	6	....	26
Coal	2	....	3	....	....	....	3	Okmulgee	2	....	5	1	....	....	6
Comanche	8	....	16	6	2	....	24	Osage	2	1	4	1	....	....	6
Craig	2	1	1	3	1	....	6	Ottawa	1	1	....	1	1	....	3
Creek	4	2	6	6	1	....	15	Pawnee	6	2	6	10	1	....	19
Custer	4	2	7	2	4	1	16	Payne	4	....	3	4	2	....	9
Delaware	3	1	1	4	1	1	8	Pittsburg	3	....	6	3	....	....	9
Dewey	9	....	4	6	10	7	27	Pontotoc	5	....	9	1	2	....	12
Ellis	3	....	5	5	....	....	10	Pottawatomie	6	....	12	5	3	....	20
Garfield	2	....	8	1	....	....	9	Pushmataha	5	....	12	1	....	....	13
Garvin	2	1	5	1	1	....	8	Roger Mills	5	....	6	4	2	2	14
Grady	6	1	9	5	5	....	20	Rogers	3	....	9	2	....	....	11
Grant	6	5	14	....	....	....	19	Seminole	4	1	2	2	4	3	12
Greer	3	5	5	....	....	1	11	Sequoyah	3	....	4	4	....	....	8
Harmon	5	2	5	1	6	1	15	Stephens	5	....	6	4	....	1	11
Harper	3	2	5	....	1	1	9	Texas	8	1	5	2	2	16	26
Haskell	3	....	1	5	....	....	6	Tillman	3	3	4	1	....	....	8
Hughes	5	2	7	3	1	2	15	Tulsa	2	1	3	2	....	....	6
Jackson	9	3	15	4	3	....	25	Wagoner	3	....	4	4	....	....	8
Jefferson	1	....	1	1	1	....	3	Washington	2	2	3	1	....	....	6
Johnston	1	....	3	....	....	....	3	Washita	6	3	9	9	....	....	21
Kay	9	2	16	6	1	....	25	Woods	3	....	8	1	....	....	9
Kingfisher	6	1	13	5	2	....	21	Woodward	4	1	6	3	1	3	14
Kiowa	7	5	9	2	....	....	16								
Latimer	4	....	8	3	1	....	12	72 counties	297	69	413	233	101	72	888
Lincoln	11	1	11	13	8	....	33	Per cent	....	7.8	46.5	26.2	11.4	8.1	....
Logan	4	....	6	5	1	....	12								

Reporters' remarks:

Alfalfa County: "Wells supplied from sheet water (varying in depth according to elevation) 20 to 30 feet in thickness." Beaver County: "Go to sheet water and there is no limit to the supply." "Water supply in shallow wells seems to get stronger." "Sheet water; most wells will supply a 3-inch cylinder windmill pump." "Supply in sheet water; in 21 years I have never known wells to fail if sunk to main flow of sheet water; water not rising much in wells, but springs are generally stronger." Beckham County: "Water generally rising higher and not influenced by weather; wells grow stronger with use; streams begin to run before rain." Bryan County: "Low water, due to continued dry weather." Caddo County: "Very little rain for 22 months." "Water deep, but good; if deep enough, no windmill will pump any well out." Canadian County: "Wells seldom change on account of dry weather." "No change in water supply, except as springs and branches have run low on account of extreme drought." Cherokee County: "Only slight variation produced by extreme droughts or excessive rains; no failing wells or springs." "Many wells lower than ever known, springs dry; think because of the dry year of 1909, as there has been sufficient rain this season. The question 'What is the cause of our wells failing?' is asked by many." Cleveland County: "A considerable rise in most wells in 1908." Comanche County: "A spring broke out two years ago and is still flowing." "Less than 15 inches rainfall since January 1, 1910, and most wells are dry or very low." "Continued dry weather is affecting water in most wells." "Insufficient rainfall for 18 months has reduced the supply of well water." Craig County: "Four springs have

failed, and 4 or 5 wells have been abandoned for failure of water." Creek County: "Water never gets lower or higher; we call it sheet water; many springs run the same all the time." Custer County: "Two little creeks have running water now all the time, where they were dry 10 to 12 years ago except after a big rain." "Creeks that had water only in holes in summer 12 to 15 years ago run freely now all the year; springs are breaking out and becoming strong streams; seventeen years ago Washita River would go dry, except in holes; now it runs flush all the time." Dewey County: "Most wells are sheet water, and the depth varies according to lay of the land." "Never heard of a well going dry." "Dry weather has no effect on wells; we get water in sand and gravel." "Have lived here 15 years; springs have appeared in all canyons and creeks in the last 5 years." "Many springs are breaking out. Where land is wild there are no springs, but breaking the land lets the water into the soil, to burst out along the sides of canyons." "We have sheet water; all wells have to go to a certain level to find it." Ellis County: "No change in water level." "Water is known as sheet water." Garfield County: "On town site of Garver at least 50 dry holes have been sunk; within 60 days 10 wells have been drilled; only 1 dry hole, and in the others water was obtained at from 10 to 35 feet." Garvin County: "Only about 1 spring now where there were 10 in 1890, but plenty of water in wells." Grady County: "Water level about the same. Difference in depth is due to the land elevation." Grant County: "No difference in the water in wells in 16 years." "We have what is commonly called sheet water." Greer County: "A well 11 feet deep furnishes all the country round with drinking water; some come 13 miles and haul water from it." Harmon County: "The Sandy Creek now flows, fed by seeps and springs, about 16 miles higher upstream than before 1905." "There seems to be a sheet of water at about 150 to 200 feet." "A spring watered many head of stock until 1909; now it seems to have dried away." Hughes County: "Two springs have failed." Jackson County: "Have lived here since 1888; if we have several wet years in succession, the water level will rise a few feet; we have now had two dry years." "On account of two very dry seasons the water has descended about 4 feet in this subirrigated valley." Kay County: "No change in water since 1893." "Water in wells never gets any higher or lower." Kingfisher County: "Water in wells inexhaustible; sheet water." Kiowa County: "Wells that have been good are going dry; no rain for nearly a year." "Many wells run down and some dry up." "On account of drought for the last 2 years a good many wells have failed." "A good many good running streams now, where 18 years ago they would not water 2 horses." Latimer County: "General complaint of wells failing, though some are strong as ever." "Dry weather and clearing land cause failure in wells." Lincoln County: "No one drills in vain; I have never heard of a well going dry." "Wells dug 14 years; no increase or decrease in water supply." "Been here 20 years; clearing of timber caused a few shallow wells to fail, but does not affect deep wells." "Wells seem to be supplied from sheet water." "A well dry when dug in 1892. They hauled and put water in it, and in 4 or 5 years it furnished water for household and stock and is a fine well." Logan County: "Have never known a well to go dry in 21 years. Wells can be obtained anywhere." "A rise rather than a fall; springs have strengthened." "Wells do not seem to be affected much by dry weather." Major County: "Springs that always went dry in summer until 1904, when land was broken, have never gone dry since." Mayes County: "Severe drought accounts for the lowering of water in wells." McClain County: "Two exceedingly dry years is the cause of the water being so low." "The worst trouble is the creeks fill up and stop running; where they used to be in holes 4 to 8 feet deep, now they are not over 6 to 18 inches deep." McIntosh County: "Wells not strong as when made." Noble County: "A well did not furnish much water for several years after being drilled; now the supply is abundant." "Water lower in wells than ever before, on account of dry weather." Oklahoma County:

"Sheet water is usually struck at 80 or 90 feet." "In 8 years never heard of a well going dry; water found at level of Canadian River and never fails." Osage County: "Several wells have failed and several springs have gone dry on account of 4 months' drought; in fact, very little rain for 16 months." Pawnee County: "At about 100 feet get sheet water." "Wells have failed on account of extreme dry weather." Pittsburg County: "Some wells dry, owing to dry weather." "Water supply is inexhaustible." Pottawatomie County: "Water is gradually coming toward the surface in wells." Pushmataha County: "No wetting rain for a year and a half. Wells and springs nearly dry." Seminole County: "The water seems to be sheet water; difference in depth due to elevation." Stephens County: "Plenty of good water." "Water supply abundant." "Wells do not vary." "For 10 miles around we have a sheet of water. Wells get no weaker in time." "Some wells have failed this year." Texas County: "Have never heard of water supply changing underground, but it varies on top; it seems as though the fountain has dried up." "Water in this section is sheet water, and depth varies only with the surface." "Sheet water; all about the same depth; inexhaustible. Windmills run for weeks at a time, but water stands at the same depth." Tillman County: "Sandy land has sheet water, abundant and good; 'tight' land has streams, and most of the wells have gone dry." "Only one rain in two years; water level in wells gradually getting lower." "A very dry summer, and wells are low and water scarce." Washington County: "Several springs failed; wells have gone low." Washita County: "Water level the same; no difference in 12 years." "No change in the depth of wells." "Ten years ago the average depth of water in wells was 45 feet; to-day it is about 8 feet." Woods County: "Sheet water, and seems to be inexhaustible." Woodward County: "Springs have broken out in valleys dry 11 years ago; wells afford an abundance of water. The water level is evidently rising." "All sheet water; not affected by dry weather; depth owing to elevation."

The remarks well illustrate the subsoil-water relations brought out by the records. At some stations the physiography and structure are such that the exceptional drought of 1909–10 affected the wells and springs; at other stations the supply drawn from that Plains underflow commonly known as "sheet water" was not affected and its level was not perceptibly lowered; while at still other stations the effect of breaking the sod, cultivating the soil, and planting crops and groves has so far diminished the storm run-off as to raise the local level of water in the ground, thereby strengthening springs and streams no less than wells. It seems probable that in Oklahoma (and Texas) the long-continued drought noted by many reporters exercised an exceptional effect on the well water level, and explains a material part of the lowering shown by the figures.

OREGON.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Baker	*a* 13	1894	17	24.2	14	9.3	13	9.7	10	2	16	5	17	17	15.3
	b 2	1910	2	180	2	175.5	2	175.5	2	....	.....	....	.....	2	4.5
Benton	*a* 15	1886	17	32.2	14	10	17	6.8	14	....	.....	7	35.5	17	25.4
Clackamas	*a* 21	1894	23	30.6	20	6	23	5.1	20	1	1	5	17	23	25.5
Clatsop	*a* 1	1906	1	12	1	3	1	3	1	....	.....	....	.....	1	9
Columbia	*a* 7	1899	10	35.2	8	8.4	10	4.2	8	....	.....	8	39	10	31
Coos	*a* 4	1890	4	26.5	2	10	4	3.5	2	....	.....	2	14	4	23
Crook	*a* 2	1889	2	15	2	3	1	4	1	....	.....	....	.....	2	12
Curry	*a* 1	1907	5	21	3	5	5	4	3	....	.....	1	1	5	17
Douglas	*a* 21	1883	24	23.6	22	5.4	24	5.8	22	....	.....	2	1.5	24	17.9
Gilliam	*a* 4	1899	4	42.7	4	9	4	13.5	4	2	23	1	5	4	20.2
	b 1	1909	2	395	....	.....	2	55	0	....	.....	....	.....	2	340
Grant	*a* 7	1890	9	17.9	9	5.5	9	6.1	9	2	11	3	5.5	9	11.8
Harney	*a* 5	1903	7	40.9	5	13.9	7	23.4	5	3	77	1	0.5	7	17.4
Jackson	*a* 6	1884	6	20.3	6	6.5	6	3.7	6	....	.....	6	17	6	16.7
	b 1	1902	1	120	1	100	1	70	1	....	.....	1	30	1	50
Josephine	*a* 5	1874	6	20	3	4	6	4.5	3	....	.....	....	.....	6	15.5
Klamath	*b* 1	1906	2	348	....	.....	2	340	0	....	.....	....	.....	2	8
Lake	*a* 6	1897	6	17	3	28	6	3	3	1	1	2	1	6	14
Lane	*a* 10	1901	10	29.9	8	4.4	10	2.8	8	....	.....	5	14.5	10	27.1
Linn	*a* 6	1895	9	23.7	6	4	9	3.8	6	2	9.5	1	8	9	19.8
Malheur	*a* 5	1888	8	42.9	4	21.7	8	5.3	4	....	.....	4	83.5	8	37.6
	b 2	1909	4	269	2	119	4	153.2	2	....	.....	....	.....	4	115.7
Marion	*a* 9	1885	12	19.5	9	5.9	12	3.9	9	....	.....	8	14	12	15.6
Morrow	*a* 2	1900	3	33.3	2	5.5	3	5	2	....	.....	....	.....	3	28.3
	b 5	1906	5	319.6	5	104	5	110	5	1	30	....	.....	5	209.6
Multnomah	*b* 3	1906	3	118.3	3	12	3	12	3	....	.....	....	.....	3	106.3
Polk	*a* 4	1893	6	23.8	6	7.1	6	6.2	6	....	.....	2	5	6	17.6
Sherman	*a* 2	1892	2	25	2	4.5	2	3	2	....	.....	1	3	2	22
Tillamook	*a*	.....	1	20	....	.....	1	5	0	....	.....	....	.....	1	15
Umatilla	*a* 1	1881	2	35	2	21.5	2	21.5	2	....	.....	....	.....	2	13.5
Union	*a* 2	1896	2	25	2	10.5	2	10.5	2	....	.....	....	.....	2	14.5
	b 1	1890	1	190	1	5	1	4.5	1	....	.....	1	0.5	1	185.5
Wallowa	*a*	.....	2	22.5	2	3	2	3.5	2	1	1	....	.....	2	19
Wasco	*a* 4	1884	5	33.4	4	5.9	5	5.8	4	....	.....	2	4.5	5	27.6
	b 1	1908	1	436	1	30	1	30	1	....	.....	....	.....	1	456
Washington	*a* 9	1892	12	33.8	11	11.4	12	10.5	11	....	.....	1	2.5	12	23.3
Yamhill	*a* 12	1887	18	34.8	12	10.4	18	6.9	12	....	.....	8	48.5	18	27.9
	b 1	1883	1	500	1	460	1	460	1	....	.....	....	.....	1	40
Total	*a* 184	1890.7	233	28.1	186	7.7	228	6.5	181	14	139.5	75	337.5	233	21.7
	b 18	1904.8	22	280.5	16	108.7	22	132.0	16	1	30.0	2	30.5	22	148.5
Aggregate	202	1891.3	255	.....	202	.....	250	.....	197	15	169.5	77	368.0	255	32.6

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Baker	7	3	15	1	....	....	19	Linn	3	2	4	3	....	....	9
Benton	7	1	12	3	1	....	17	Malheur	4	1	6	1	1	3	12
Clackamas	8	4	10	9	....	....	23	Marion	4	1	11	....	....	....	12
Clatsop	1	1	....	....	....	....	1	Morrow	3	....	3	1	....	4	8
Columbia	5	1	5	3	1	....	10	Multnomah	1	....	....	....	2	1	3
Coos	2	1	2	1	....	....	4	Polk	2	....	6	....	....	....	6
Crook	1	....	2	....	....	....	2	Sherman	1	....	2	....	....	....	2
Curry	3	1	4	....	....	....	5	Tillamook	1	....	1	....	....	....	1
Douglas	8	1	21	2	....	....	24	Umatilla	2	....	2	....	....	....	2
Gilliam	3	1	1	2	....	2	6	Union	1	....	2	....	....	1	3
Grant	3	4	4	1	....	....	9	Wallowa	1	1	....	1	....	....	2
Harney	3	2	4	1	....	....	7	Wasco	2	....	3	2	....	1	6
Jackson	3	1	4	2	....	....	7	Washington	4	1	8	2	1	....	12
Josephine	2	....	6	....	....	....	6	Yamhill	8	....	13	5	1	....	19
Klamath	1	1	1	....	....	....	2								
Lake	2	1	5	....	....	....	6	31 counties	101	30	163	42	8	12	255
Lane	5	1	6	2	1	....	10	Per cent	....	11.8	63.9	16.5	3.1	4.7	....

Reporters' remarks:

Benton County: "Driest summer and fall in the history of the country; water lower in all wells and many springs much weaker." Clackamas County: "Ground water level the same for the past 20 years." Douglas County: "No wells abandoned, no springs failed; no rain for months and springs are very low." Gilliam County: "Water level is lower in streams and wells than ever before, caused by destruction of timber in Blue Mountains on the heads of the streams." Grant County: "No perceptible increase or decrease in wells; driest season known." Jackson County: "Water lower than since white people appeared." Sherman County: "Have planted trees [about well]; think they have drank the water." Wasco County: "Many springs broke out after the ground was first trampled by stock." Washington County: "Wells have not varied in average water level; streams and springs are declining, seemingly on account of deforestation of the watershed." Yamhill County: "No change of note in 58 years of experience."

Other reporters residing in irrigated valleys note the rise in water level following irrigation.

PENNSYLVANIA.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Adams	*a* 2	1882	13	26.2	4	13	13	4.6	4	....	.....	4	34	13	21.6
	b	.....	1	105	....	.....	1	25	0	....	.....	....	.....	1	80
Allegheny	*a* 6	1893	9	41.7	9	25.8	9	19.2	9	....	.....	9	59	9	22.4
	b 2	1901	2	81.5	2	31.7	2	19	2	....	.....	2	27	2	62.5
Armstrong	*a* 3	1879	4	17	3	6.7	4	4.7	3	....	.....	2	3	4	12.2
	b	.....	1	150	....	.....	1	60	0	....	.....	....	.....	1	90
Beaver	*a* 3	1868	5	41	3	4.2	5	4.6	3	....	.....	2	1.5	5	36.4
	b 4	1903	8	76.5	2	15.5	7	17	1	....	.....	1	3	8	60.6
Bedford	*a* 1	1800	3	18	1	10	3	4	1	....	.....	1	6	3	14
	b	.....	2	100	....	.....	2	30	0	....	.....	....	.....	2	70
Berks	*a* 12	1859	19	43.7	11	9.3	19	8.7	11	1	1	9	49	19	35
Blair	*a* 5	1892	6	26.9	6	8.7	6	6	6	....	.....	4	16	6	20.9
Bradford	*a* 10	1879	12	26.7	9	8.4	12	5	9	....	.....	7	33.5	12	21.7
	b 3	1898	4	173.2	2	67.5	4	152.2	2	....	.....	....	.....	4	21
Bucks	*a* 15	1844	24	19.5	16	7.3	22	5.7	14	....	.....	11	41	24	13.7
	b	.....	3	119.3	1	70	3	36.7	1	....	.....	....	.....	3	82.7
Butler	*a* 1	1879	1	42	1	3	1	2	1	....	.....	1	1	1	40
	b	.....	1	78	1	10	1	10	1	....	.....	....	.....	1	68
Cambria	*a*	.....	3	41.7	3	6.3	2	5	2	....	.....	1	4	3	36.7
	b	.....	1	80	1	25	1	25	1	....	.....	....	.....	1	55
Cameron	*a* 5	1884	5	21	5	6.2	5	3.9	5	....	.....	3	11.5	5	17.1
Carbon	*a* 8	1868	8	40.7	8	12.1	7	4.9	7	....	.....	6	47	8	34.6
	b 1	1890	1	80	1	16	1	8	1	....	.....	1	8	1	72
Center	*a* 11	1875	17	28.1	13	10	17	6.7	13	....	.....	12	46.5	17	21.3
	b 7	1906	19	160.9	....	.....	19	66.8	0	....	.....	....	.....	19	94.1
Chester	*a* 5	1858	7	24.9	4	7	7	6.4	4	....	.....	4	8	7	18.4
	b 5	1898	6	107	5	45	5	57	4	....	.....	3	45	6	56.2
Clarion	*a* 6	1890	7	23.6	5	9.6	7	6	5	....	.....	4	18	7	17.6
	b 2	1905	2	77.5	2	35	2	20	2	....	.....	1	30	2	57.5
Clearfield	*a* 4	1882	7	25.9	7	7	7	2.6	7	....	.....	7	31	7	23.3
	b 1	1902	1	165	1	82	1	82	1	....	.....	....	.....	1	83
Clinton	*a* 4	1897	4	26.2	3	4.3	3	5.7	2	....	.....	....	.....	4	21
	b 3	1890	3	127.7	1	20	3	43.3	1	....	.....	....	.....	3	84.3
Columbia	*a* 8	1863	10	25.4	9	5.1	10	4	9	....	.....	6	10	10	21.4
	b 1	1904	1	110	1	40	1	40	1	....	.....	....	.....	1	70
Crawford	*a* 10	1895	15	34.9	9	16	15	12.4	9	....	.....	6	15.5	15	22.6
Cumberland	*a* 2	1845	4	57.5	2	20	4	10.5	2	....	.....	1	10	4	47
	b 2	1896	3	162.7	3	106	2	49	2	....	.....	....	.....	3	56.7
Dauphin	*a* 11	1839	13	41.1	11	9.6	13	5.5	11	....	.....	9	48	13	35.6
	b 6	1899	6	92.2	6	38	5	48.4	5	3	30	....	.....	6	49.2
Delaware	*a* 6	1842	8	39.1	4	4.1	7	4.1	3	....	.....	1	1	8	35.1
	b 3	1908	4	109	3	104	4	69.2	3	....	.....	3	60	4	39.7
Elk	*a* 4	1896	4	35	4	14.2	4	13	4	....	.....	2	5	4	22
	b 2	1901	2	67.5	2	32.5	2	22.5	2	....	.....	1	20	2	45
Erie	*a* 4	1899	6	23.2	4	17.2	4	3.7	2	....	.....	2	13	6	12.3
	b 5	1893	5	72.2	5	49	4	43.7	4	....	.....	1	30	5	29.2
Fayette	*a* 9	1869	13	25.8	9	7	13	5.1	9	....	.....	6	19.5	13	20.7
	b 2	1895	3	88.7	3	23.3	3	6.7	3	....	.....	3	50	3	82

PENNSYLVANIA—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Forest	*a* 2	1898	4	27	2	5	4	4.7	2			2	3	4	22.2
	b 1	1895	1	90	1	40	1	30	1			1	10	1	60
Franklin	*a* 8	1850	10	46.4	8	6.4	10	3.3	8			6	36	10	43.1
	b 4	1903	4	113.7	4	51.2	3	31.3	3			2	46	4	74
Fulton	*a* 4	1890	4	26.2	4	12.5	4	8.7	4			1	15	4	17.5
	b 2	1882	2	82.5	2	30	2	25	2			1	10	2	57.5
Greene	*a* 1	1872	1	24	1	8	1	8	1					1	16
	b 2	1910	3	75.7	2	24	1	50	0					3	43
Huntingdon	*a* 7	1866	7	27	7	9.7	7	4.9	7			6	34	7	22.1
	b 2	1903	2	78	2	45	2	45	2					2	33
Indiana	*a* 1	1875	1	20	1	5	1	2	1			1	3	1	18
	b 4	1901	4	96.2	4	53.7	4	43.7	4			1	40	4	52.5
Jefferson	*a* 1	1840	1	40	1	5	1	5	1					1	35
	b 1	1910	1	125	1	30			0					1	95
Juniata	*a* 2	1880	5	33.6			5	13.8	0					5	19.8
Lackawanna	*a*		3	17.7	3	7.3	3	4.7	3			3	8	3	13
Lancaster	*a* 15	1853	17	37.6	7	20.1	17	11	7			3	20	17	26.6
	b 1	1908	1	75	1	68	1	60	1			1	8	1	15
Lawrence	*a* 2	1860	2	28.5	2	5.5	2	3.5	2			1	4	2	25
	b 1	1880	1	160			1	6	0					1	156
Lebanon	*a* 3	1872	8	43.9	4	5.6	8	5.6	4			1	1.5	8	38.2
Lehigh	*a* 1	1895	2	36.5	2	13	2	6.5	2			1	13	2	30
	b		1	217	1	70	1	70	1					1	147
Luzerne	*a* 7	1878	9	26.3	7	9.6	9	6.9	7	1	3	6	33	9	19.4
	b 1	1890	1	80	1	30	1	30	1					1	50
Lycoming	*a* 7	1875	7	29.4	7	11.1	5	4.2	5			4	48.5	7	25.3
	b 3	1896	3	105.7	2	20	1	6	0					3	91.3
Mercer	*a* 9	1881	9	24.6	9	7.9	9	5.1	9			9	25	9	19.4
	b 5	1907	6	123	2	60	5	53	1			1	22	6	65.5
Mifflin	*a* 1	1860	1	40	1	5	1	0	1			1	5	1	0
	b 2	1903	2	125	2	67.5	2	67.5	2					2	57.5
Monroe	*a* 8	1867	8	22	6	10.7	8	2.9	6			6	45	8	19.1
	b 2	1896	2	78	1	45	2	30	1			1	5	2	48
Montgomery	*a* 3	1870	5	26.2	3	14.3	5	12.4	3	1	8			5	13.8
	b 1	1897	3	97.3	1	100	3	45	1					3	52.3
Montour	*a*		2	24			2	5	0					2	19
	b		2	85			2	22.5	0					2	62.5
Northampton	*a* 11	1819	11	63.5	11	16.7	11	8.4	11			9	92.5	11	55.1
	b 3	1897	3	128	3	26.7	3	18.7	3			3	24	3	99.3
Northumberland	*a* 4	1852	6	24.5	4	13.2	6	9.3	4			4	13	6	15.2
	b		3	73.3	1	60	3	40	1					3	33.3
Perry	*a* 9	1853	11	30.1	6	7	11	9.3	6	1	3	4	11	11	20.8
	b 3	1897	3	76.7	3	27.3	3	27.3	3					3	49.3
Pike	*a* 6	1873	7	25.4	6	10	7	6	6			3	23	7	19.4
	b 1	1908	2	105	1	120	2	70	1					2	35
Potter	*a*		3	12	3	6.3	3	5	3			3	4	3	7
	b		1	200	1	60	1	40	1			1	20	1	220
Schuylkill	*a* 2	1867	2	24			2	6	0					2	18
	b 4	1898	4	115.7	3	73.3	4	52.5	3			3	45	4	63.2
Snyder	*a* 3	1851	3	28.7	3	6	3	2.2	3			3	11.5	3	26.5
	b		1	80			1	35	0					1	45
Somerset	*a* 4	1882	4	19.5	4	9	4	7.2	4			3	7	4	12.2
Susquehanna	*a* 4	1856	4	17.7	4	11.2	4	9	4			1	9	4	8.7
	b 1	1899	1	195	1	115	1	115	1					1	80
Tioga	*a*		2	24.5	2	4.5	2	2	2			2	5	2	22.5
	b		2	81	2	41	2	36	2			1	10	2	45
Venango	*a* 2	1892	4	27.5	4	8	2	3	2			2	6	4	21
	b 1	1886	3	74	1	60	2	47.5	0					3	22.3
Warren	*a* 2	1907	2	17.5	2	7	2	7	2					2	10.5
	b 1	1910	2	120	1	161	2	98	1					2	22
Washington	*a* 1	1900	4	30.7	4	8.4	4	7.4	4			1	4	4	23.4
	b 1	1886	1	89	1	30			0					1	59
Wayne	*a* 4	1872	8	28.7	5	11.8	8	6.6	5			4	23	8	22.1
	b 1	1887	1	90			1	12	0					1	78
Westmoreland	*a* 2	1864	2	17	2	2.5	2	2.5	2					2	14.5
Wyoming	*a* 3	1860	3	32.3	3	12.7	3	11	3			3	5	3	21.3
	b		1	110	1	110	1	110	1					1	0
York	*a* 5	1853	6	36	6	6.6	6	5.1	6			5	9	6	30.9
Total	*a* 299	1866.8	415	31.2	307	10.0	403	6.8	295	4	15.0	218	1049.0	415	24.1
	b 97	1899.6	146	111.7	88	51.2	132	48.2	74	3	30.0	32	513.0	146	63.3
Aggregate	396	1874.9	561		395		535		369	7	45.0	250	1,562.0	561	34.3

PENNSYLVANIA—Continued.

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Adams	4	3	6	4	1	....	14	Lackawanna	1	....	3	....	....	....	3
Allegheny	4	....	7	3	1	....	11	Lancaster	7	....	11	7	....	....	18
Armstrong	2	1	3	....	1	....	5	Lawrence	1	....	2	....	....	1	3
Beaver	5	....	2	9	2	....	13	Lebanon	4	1	3	1	3	....	8
Bedford	2	1	2	1	1	....	5	Lehigh	2	....	1	1	....	1	3
Berks	6	....	10	8	1	....	19	Luzerne	4	1	7	2	....	....	10
Blair	2	....	5	1	....	....	6	Lycoming	3	....	5	3	1	1	10
Bradford	5	3	9	4	....	....	16	Mercer	5	3	5	3	4	....	15
Bucks	10	7	14	4	1	1	27	Mifflin	1	....	....	2	1	....	3
Butler	1	....	....	1	1	....	2	Monroe	3	1	8	....	1	....	10
Cambria	2	....	1	3	....	....	4	Montgomery	4	1	4	2	1	....	8
Cameron	2	2	3	....	....	....	5	Montour	1	1	....	2	1	....	4
Carbon	3	1	1	6	1	....	9	Northampton	5	....	3	3	7	1	14
Center	9	3	13	5	9	6	36	Northumberland	3	3	3	3	....	....	9
Chester	4	1	6	4	1	1	13	Perry	5	3	6	4	1	....	14
Clarion	3	1	5	2	1	....	9	Pike	3	....	7	2	....	....	9
Clearfield	3	1	4	2	1	....	8	Potter	2	3	....	....	....	1	4
Clinton	3	1	2	2	1	1	7	Schuylkill	2	1	1	2	2	....	6
Columbia	5	1	7	2	1	....	11	Snyder	1	....	2	2	....	....	4
Crawford	6	3	8	4	....	....	15	Somerset	2	1	3	....	....	....	4
Cumberland	2	1	2	1	3	....	7	Susquehanna	2	3	1	....	1	....	5
Dauphin	7	2	7	6	4	....	19	Tioga	2	1	....	3	....	....	4
Delaware	4	....	5	6	1	....	12	Venango	2	....	6	1	....	....	7
Elk	2	....	4	1	1	....	6	Warren	2	2	1	1	....	....	4
Erie	3	3	7	1	....	....	11	Washington	2	....	3	2	....	....	5
Fayette	6	1	10	3	1	1	16	Wayne	4	1	7	....	1	....	9
Forest	2	1	2	2	....	....	5	Westmoreland	1	....	2	....	....	....	2
Franklin	5	....	5	5	3	1	14	Wyoming	1	1	3	....	....	....	4
Fulton	2	2	1	2	1	....	6	York	2	1	1	4	....	....	6
Greene	1	....	2	1	1	....	4								
Huntingdon	3	....	7	2	....	....	9								
Indiana	2	....	1	3	1	....	5	63 counties	201	68	262	150	65	16	561
Jefferson	1	....	....	1	1	....	2	Per cent	....	12.1	46.7	26.7	11.6	2.9	....
Juniata	3	1	3	1	....	....	5								

Reporters' remarks:

Adams County: "Deep wells affect water level in shallow wells." "Water level seems very much lower than 10–15 years ago; 40-foot wells are now being drilled 60 to 90 feet deeper." "Over half of the dug wells were drilled deeper in the last 5 years; several springs have failed and wells gone dry." "For some reason or other wells must be dug deeper than 20 or 30 years ago." Allegheny County: "Drilling for oil and gas has lowered the water level to a great extent." "The wells do not have more than half the water they used to have; some of the wells have gone dry." Beaver County: "Dug wells are something of the past." Bedford County: "The old dug wells get short of water; they drill from 40 to 100 feet deeper and get plenty." Berks County: "Water is getting decidedly lower." Center County: "Springs have been decreased and are getting weaker; all of our larger streams are weaker—in a 10-year average they have fallen off nearly one-quarter in size; protect the watershed and you will have no trouble about water; so long as the watershed is not protected you will not have any water." "Some wells have been deepened; many springs dry up; we attribute it to the timber being taken off." Clarion County: "Wells lowered by deep drilling in the vicinity." Erie County: "Clearing and cultivation of the land have more or less affected our dug wells and springs, but not our rock wells." Fayette County: "Dry wells caused by taking out the coal; over half the wells have either been abandoned or are failing." Franklin County: "The lower streams lie from 6 to 8 feet lower than they did, say, 50 years ago." "The drilling of wells has affected the flow of springs, drying some entirely up." "It seems that waters are lower in the earth." "Some wells have failed, but they have been doing so for a number of years." Fulton County: "Some streams are diminishing in size on account of a great amount of timber being cut out." Huntingdon County: "A spring has failed in the last few years and is now

abandoned; springs do not furnish the water supply they did formerly." "Many springs have gone dry within the last 25 years and many are comparatively weak; our waters are becoming lower every year as the hills and mountains are denuded of their timber." Lancaster County: "A number of springs have gone dry in the last 70 years; the removal of timber in some cases seems to have caused this; in others the removal of trees does not seem to have affected the springs." Lawrence County: "Small streams dry up sooner than formerly; caused by land drainage and timber being cut off." Lebanon County: "The water level has fallen from 1 to 1½ feet within the last 15 years." "Two springs have failed because timber was cut away." Luzerne County: "Water is failing in wells and springs." Lycoming County: "Some springs have run dry since 1881." "Some springs and dug wells are dry." Mercer County: "Wells have not failed altogether, but have gone bad." "Some springs have broken out since the land was cleared of timber, but many have failed." "A good many springs have dried up; dug wells have been tapped by coal mining." "Dry seasons have made some change in dug wells and springs." Mifflin County: "Wells generally abandoned; farmers cooperating in piping water from the mountains." Northampton County: "The wells are nearly all abandoned and cisterns are made." "Cement industries drain the wells and creeks." Pike County: "One probable cause of the decline in water supply is the cutting of the timber." Washington County: "The mining of coal takes practically all the water except in a very few springs, and the connected spring and cistern is the most common form of water supply." York County: "Wells and springs do not seem to be much affected, yet the water is lower than formerly; the creeks show that there is less water."

The remarks of Pennsylvania reporters indicate recognition of the effect of modern industrial development on springs and creeks no less than on wells; yet it is noteworthy that the schedule records of lowering in water level are quite as great at other stations and in other counties as where the lowering is ascribed to mining operations—largely, of course, for the reason that abandoned wells are seldom recorded.

RHODE ISLAND.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Providence	*a* 11	1852	14	24.4	11	6.9	14	3.8	11	....	.....	8	38.5	14	20.6
Washington	*a* 6	1792	6	28.2	6	5.7	6	5.7	6	....	.....	....	.....	6	22.5
Total	*a* 17	1830.8	20	25.5	17	6.5	20	4.4	17	0	0.0	8	38.5	20	21.1

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	Total.
Providence	5	1	10	2	1	14
Washington	2	.....	6	.....	.....	6
2 counties	7	1	16	2	1	20
Per cent	.....	5.0	80.0	10.0	5.0	.....

Reporters' remarks:

Providence County: "No change in wells for the last 40 years." Washington County: "No change in water level in 36 years."

The remarks are congruous with the records which indicate notable stability of the water level in Rhode Island (and Connecticut)—the change in this low-lying portion of New England being materially less than that recorded farther northward.

SOUTH CAROLINA.

COASTAL.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Aiken	a	12	1877	13	49.5	12	6	13	4.7	12	1	1	6	18.5	13	44.8
Bamberg	a	5	1879	12	28.4	11	7	3	6	2	....	.....	....	.....	12	21.5
Barnwell	a	14	1898	15	30.1	14	4.7	15	3.9	14	2	2	9	14.5	15	26.3
Beaufort	a	4	1884	6	11.5	3	4.7	6	4.2	3	2	2	1	2	6	7.3
	b	3	1902	6	131.2	6	128.3	6	128.3	6	....	.....	....	.....	6	2.8
Berkeley	a		.....	3	16.3	1	4	3	6	1	1	1	....	.....	3	10.3
Calhoun	a	2	1825	3	45	2	9	3	7	2	....	.....	2	3	3	38
	b		.....	2	165	....	.....	2	142.5	0	....	.....	....	.....	2	22.5
Charleston	a	9	1859	11	15.8	7	5.1	11	6.3	7	....	.....	....	.....	11	9.5
	b	3	1902	5	348	1	500	5	338.8	1	....	.....	....	.....	5	9.2
Clarendon	a	3	1877	4	24.2	3	14	4	4.5	3	....	.....	3	29	4	19.7
Colleton	a	9	1885	16	20.2	13	10.1	12	7.9	9	4	7	5	19	16	11.9
	b	1	1905	1	120	1	5	1	0	1	....	.....	1	5	1	120
Darlington	a	5	1898	7	32.9	5	8.5	7	7.4	5	....	.....	3	6	7	25.5
Dillon	a	8	1887	10	22.3	5	3.4	10	4.4	5	....	.....	5	12	10	17.9
	b	1	1910	1	250	1	250	....	.....	0	....	.....	....	.....	1	0
Dorchester	a	3	1891	3	24.3	3	17.7	3	15.3	3	....	.....	3	7	3	9
Florence	a	3	1870	6	23.8	1	10	6	7.3	1	....	.....	....	.....	6	16.5
	b	6	1905	6	139.2	3	83.3	4	113.7	3	....	.....	....	.....	4	32.5
Hampton	a	4	1900	7	15.9	4	5	7	4.3	4	1	2	....	.....	7	11.6
	b	1	1902	1	201	1	201	1	201	1	....	.....	....	.....	1	0
Horry	a	3	1900	6	19.2	3	11	6	9	3	....	.....	1	1	6	10.2
	b	1	1896	2	262.5	2	262.5	2	262.5	2	....	.....	....	.....	2	0
Marion	a	2	1867	5	16.8	5	3.6	5	2.8	5	....	.....	3	4	5	14
	b	1	1896	1	135	1	135	1	135	1	....	.....	....	.....	1	0
Marlboro	a	3	1828	8	32.7	5	4.6	8	4.5	5	1	1	3	6	8	28.2
Orangeburg	a	17	1886	20	28.1	14	9.3	16	8.3	10	....	.....	4	20	20	20.2
	b	2	1901	4	243.7	4	228.2	2	184.5	2	....	.....	1	2	4	16
Richland	a	2	1838	2	26.5	2	5.5	2	5.5	2	....	.....	....	.....	2	21
	b	1	1907	1	78	1	70	1	70	1	....	.....	....	.....	1	8
Sumter	a	5	1895	5	51	5	4.4	4	3.5	4	....	.....	1	1	5	46.8
Williamsburg	a	8	1891	14	22.7	8	8.5	14	6.2	8	....	.....	4	7	14	16.5
	b	3	1898	3	376	3	376	3	376	3	....	.....	....	.....	3	0
Total	a	121	1879.8	176	26.8	126	7.2	158	6.0	108	12	16.0	53	150.0	176	20.6
	b	23	1902.4	33	215.3	24	197.8	28	201.1	21	0	0.0	2	7.0	31	13.9

PIEDMONT.

Abbeville	a	10	1873	12	43.4	12	6.7	12	5.6	12	....	.....	6	14	12	37.8
Anderson	a	14	1878	14	39.6	13	6.8	14	5.4	13	1	0.5	7	16	14	34.3
Cherokee	a	9	1886	12	40.4	10	6.8	12	5.2	10	1	2	6	13.5	12	35.2
Chester	a	6	1886	7	36	6	6.2	7	2	6	....	.....	6	30	7	34
Chesterfield	a		.....	3	23	3	3	3	3	3	....	.....	....	.....	3	20
Edgefield	a	16	1883	22	48.6	11	8.4	21	6.5	10	....	.....	7	27	22	42.2
Fairfield	a	14	1883	17	51.4	17	10.7	17	9.9	17	....	.....	4	13	17	41.4
Greenville	a	5	1895	9	33.7	9	7.9	9	6.4	9	3	2.5	5	15.5	9	27.2
	b	1	1907	1	478	1	140	....	.....	0	....	.....	....	.....	1	338
Greenwood	a	8	1876	20	37.8	12	9.2	20	8.4	12	1	2	5	13	20	29.4
Lancaster	a	11	1886	12	45.1	10	7.8	12	5.5	10	....	.....	8	25	12	39.6
Laurens	a	7	1891	12	41.7	8	9	12	6.3	8	....	.....	6	31	12	35.3
Lexington	a	12	1889	12	48.2	12	4.8	12	1.9	12	....	.....	9	35	12	46.2
Newberry	a	8	1868	13	45	4	10.5	11	8.9	2	....	.....	1	5	13	36.4
Oconee	a	20	1895	20	52.8	17	5.7	20	4.6	17	1	2	5	17.5	20	48.2
Pickens	a	10	1878	15	48.4	12	6.4	15	5.9	12	3	9	1	1	15	41.8
Saluda	a	6	1888	6	46.5	6	10.6	6	9.7	6	1	0.5	4	6	6	36.8
Spartanburg	a	7	1887	10	39.8	10	4.6	7	3.1	7	....	.....	4	12.5	10	36.4
Union	a	13	1878	14	48.9	14	8.7	13	7.1	13	3	5	7	25.5	14	41.6
York	a	11	1887	11	45.8	11	6.6	11	5.6	11	....	.....	3	11	11	40.2
	b	3	1899	3	126.7	3	10	2	9.2	2	....	.....	2	1.5	3	117.2
Total	a	187	1883.9	241	44.6	197	7.5	234	6.1	190	14	23.5	94	311.5	241	38.4
	b	4	1901.0	4	214.5	4	42.5	2	9.2	2	0	0.0	2	1.5	4	172.4
State total	a	308	1882.1	417	37.1	323	7.4	392	6.1	298	26	39.5	147	461.5	417	30.9
	b	27	1902.2	37	215.2	28	175.6	30	188.3	23	0	0.0	4	8.5	35	32.0
Aggregate		335	1883.9	454	.....	351	.....	422	.....	321	26	39.5	151	470.0	452	31.0

SOUTH CAROLINA—Continued.

PROPORTIONATE DEPTHS—COASTAL.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Aiken	6	1	2	7	3	....	13	Florence	3	2	6	1	1	....	10
Bamberg	5	2	7	2	1	....	12	Hampton	4	2	6	....	....	....	8
Barnwell	6	4	7	3	1	....	15	Horry	3	4	4	....	....	....	8
Beaufort	4	9	3	....	....	....	12	Marion	2	1	5	....	....	....	6
Berkeley	2	....	3	....	....	....	3	Marlboro	4	....	5	3	....	....	8
Calhoun	2	....	2	3	....	....	5	Orangeburg	8	7	13	4	....	....	24
Charleston	4	10	6	....	....	....	16	Richland	1	1	2	....	....	....	3
Clarendon	2	....	4	....	....	....	4	Sumter	2	....	1	2	2	....	5
Colleton	7	8	8	....	....	1	17	Williamsburg	6	6	10	1	....	....	17
Darlington	3	....	5	2	....	....	7								
Dillon	5	1	10	....	....	....	11	21 counties.	80	60	110	28	8	1	207
Dorchester	1	2	1	....	....	....	3	Per cent	....	29.0	53.1	13.5	3.9	0.5	....

PROPORTIONATE DEPTHS—PIEDMONT.

Abbeville	5	....	3	9	....	....	12	Lexington	4	....	....	10	2	....	12
Anderson	5	....	7	7	....	....	14	Newberry	5	....	4	8	1	....	13
Cherokee	5	1	4	7	....	....	12	Oconee	7	....	2	13	5	....	20
Chester	3	....	5	1	1	....	7	Pickens	5	....	4	8	3	....	15
Chesterfield	1	....	3	....	....	....	3	Saluda	2	....	1	5	....	....	6
Edgefield	8	....	9	10	3	....	22	Spartanburg	3	....	3	6	1	....	10
Fairfield	6	....	6	9	2	....	17	Union	5	....	4	8	2	....	14
Greenville	4	....	7	2	....	1	10	York	5	....	4	7	1	2	14
Greenwood	7	....	12	8	....	....	20								
Lancaster	4	....	4	7	1	....	12	19 counties.	89	1	86	132	23	3	245
Laurens	5	....	4	7	1	....	12	Per cent	....	0.4	35.1	53.9	9.4	1.2	....

Reporters' remarks:

Abbeville County: "Many of the wells went nearly dry and had to be dug deeper." Cherokee County: "Almost every well dug prior to 1900 has gone dry and has had to be dug from 3 to 6 feet deeper. One spring has failed in the last 5 years; another has increased 75 per cent. Chester County: "A spring has gone dry." Edgefield County: "Seven springs in one mile square have failed in the last 10 or 15 years." Greenwood County: "A number of springs have gone dry, attributed to soil washing." Lancaster County: "Several springs which have been used 50 years or more have gone dry." Lexington County: Lowering of wells ascribed to "wider area of land getting under cultivation." Saluda County: "Many springs have dried from cultivation; streams greatly reduced." Union County: "Some springs have failed." "Water seems to have risen in the past 10 or 12 years." York County: "Wells affected by Charleston earthquake." Aiken County: "At the time of the Charleston earthquake a few of the wells had to be dug deeper." Dorchester County: Well water level apparently controlled by railroad pump. Marlboro County: "In the past 3 or 4 years the depths of wells have had to be increased; water supply for the future with present conveniences seems inadequate."

Both the remarks and the schedule records indicate that the water level in wells lies deeper and is lowering more rapidly in the Piedmont region where settlement is extending than in the coast-plain region, in which recent changes in settlement are on the whole less.

SOUTH DAKOTA.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Armstrong	a 1	1907	1	28	1	10	1	6	1	....	.....	1	4	1	22
Aurora	a 8	1891	8	16.9	8	4.7	8	5.5	8	3	6	....	.....	8	11.4
	b 2	1896	5	679	3	911.7	5	628	3	....	.....	2	50	5	51
Beadle	a 8	1894	11	32.5	11	11.5	11	9	11	1	5	7	32	11	23.5
	b 3	1905	6	474.2	5	534	6	456.7	5	....	.....	....	.....	6	17.5
Bonhomme	a 5	1889	6	40	5	15.4	6	16	5	....	.....	4	21	6	24
	b 4	1905	7	372.9	6	325	7	307.1	6	....	.....	....	.....	7	65.7
Brookings	a 13	1899	14	42.4	13	15.1	14	7.2	13	....	.....	10	105	14	35.2
	b 3	1896	4	197.5	3	116.7	4	87.5	3	....	.....	3	80	4	110
Brown	a 12	1897	12	24.7	9	3.3	12	3.1	9	....	.....	5	7.5	12	21.6
	b 4	1900	12	923.9	8	973.4	12	916	8	....	.....	....	.....	12	7.9
Brule	a 9	1893	10	34.1	8	9.2	10	10.7	8	....	.....	4	12	10	23.4
	b 2	1896	2	933.5	2	913.5	2	913.5	2	....	.....	....	.....	2	20
Buffalo	a 3	1901	3	31.3	3	11	3	11	3	....	.....	....	.....	3	20.3
Butte	a 4	1898	6	18.2	3	5.3	6	6.2	3	....	.....	....	.....	6	12
Campbell	a 1	1903	21	56.3	1	40	20	12.8	0	....	.....	....	.....	21	42.2
Charles Mix	a 5	1896	5	23.8	5	11.8	5	11.8	5	1	4	1	4	5	12
	b 9	1904	12	412.6	10	297.7	11	277.2	10	....	.....	1	3	11	83.4
Clark	a 4	1891	9	48.1	8	14.4	8	16.5	7	1	2	2	5	9	32.3
	b 3	1895	3	580	3	580	3	580	3	....	.....	....	.....	3	0
Clay	a 6	1901	10	34.4	6	17	10	13	6	....	.....	2	3.5	10	21.3
	b 8	1895	13	186.7	10	153	10	153.5	7	....	.....	....	.....	13	60.5
Codington	a 11	1895	11	62.8	11	30.7	9	25.8	9	2	4	1	20	11	33.5
Custer	a 6	1898	6	20.8	6	8.5	5	8.1	5	....	.....	4	6.5	6	13.4
	b 3	1909	3	80	3	33.3	3	30	3	....	.....	1	10	3	50
Day	a 6	1895	7	25.4	5	14	7	9.2	5	....	.....	3	13.5	7	16.2
	b 4	1898	4	118	2	45	4	37.2	2	....	.....	2	41	4	80.7
Deuel	a 12	1895	14	36.9	13	16.7	13	15.8	12	....	.....	4	14	14	21.8
	b 3	1898	3	112.7	3	36.7	3	30	3	....	.....	1	20	3	82.7
Douglas	a 8	1895	9	17.4	7	6.1	9	6.1	7	1	6	1	2	9	11.3
	b 11	1901	19	342.2	9	310.2	19	232.2	9	....	.....	1	10	19	110
Edmunds	a	.....	2	55	2	35	2	35	2	....	.....	....	.....	2	20
	b 10	1905	11	1,126.5	11	1,126.5	11	1,126.5	11	....	.....	....	.....	11	0
Fall River	a 14	1902	14	24.6	12	4.5	14	3.1	12	2	1	7	17	14	21.5
	b 2	1902	2	122.5	2	31	2	31	2	....	.....	....	.....	2	91.5
Faulk	a 9	1895	9	33.8	8	8	9	8.7	8	3	20	5	18	9	25.1
	b 3	1907	11	1,188.6	11	1,188.6	11	1,188.6	11	....	.....	....	.....	11	0
Gregory	a 11	1904	14	25.6	14	6.6	12	6.4	12	3	9.5	3	14.5	14	19.4
Hamlin	a 1	1900	9	37.7	1	10	9	7.4	1	....	.....	1	2	9	30.2
	b	.....	1	900	1	900	1	900	1	....	.....	....	.....	1	0
Hand	a 11	1895	13	82.4	11	26.2	10	28.4	8	....	.....	2	2	13	55.5
	b 1	1908	5	1,315	5	1,315	5	1,315	5	....	.....	....	.....	5	0
Hanson	a	.....	2	35	....	.....	2	7.5	0	....	.....	....	.....	2	27.5
	b 6	1899	7	225.4	7	222.6	7	225.4	7	2	20	....	.....	7	0
Harding	a 6	1909	6	32.3	6	7	6	6.7	6	....	.....	2	2	6	25.7
Hughes	a 4	1901	4	48.5	3	6	3	10.3	2	....	.....	2	6	4	39.2
	b	.....	1	1,600	1	1,600	1	1,600	1	....	.....	....	.....	1	0
Hutchinson	a 12	1894	12	39.7	12	15.1	12	11.3	12	....	.....	10	46	12	28.4
	b 3	1893	5	311.2	5	293.2	5	285.2	5	....	.....	1	40	5	26
Hyde	a 9	1899	13	71.8	12	16.6	13	19.3	12	2	11	1	9	13	52.5
	b 2	1903	5	1,308.4	5	1,308.4	5	1,308.4	5	....	.....	....	.....	5	0
Jerauld	a 3	1891	9	48.2	3	4	9	14.2	3	....	.....	....	.....	9	34
	b	.....	3	800	3	800	3	800	3	....	.....	....	.....	3	0
Kingsbury	a 3	1904	5	43	3	32.3	5	20.8	3	....	.....	....	.....	5	22.2
	b 12	1903	18	557.1	13	643.8	15	552.5	10	....	.....	....	.....	18	63.6
Lake	a 6	1897	8	36.6	6	24.1	8	8.1	6	....	.....	2	86	8	28.6
	b 8	1900	12	264.4	9	117.8	10	160.3	7	1	6	1	3	12	103.7
Lawrence	a 4	1904	4	20.7	4	7.2	4	5.5	4	....	.....	3	7	4	15.2
Lincoln	a 5	1894	5	16.8	5	7.4	5	6.3	5	....	.....	3	5.5	5	10.5
	b 4	1899	6	137	3	56.7	6	45.3	3	....	.....	1	28	6	91.7
Lyman	a 8	1907	14	25.9	11	8.2	14	4.4	11	....	.....	10	44	14	21.4
	b 1	1907	2	1,549	2	1,549	2	1,549	2	....	.....	....	.....	2	0
Marshall	a 10	1894	11	28.5	10	6.4	10	7.6	9	2	20	3	10	11	21.4
	b 2	1897	7	689.1	7	681.9	7	681.9	7	....	.....	....	.....	7	7.3
McCook	a 5	1900	5	40	5	11.6	5	10.5	5	1	5	2	10.5	5	29.5
	b 5	1899	5	172.8	5	105	5	99	5	....	.....	1	30	5	73.8
McPherson	a 10	1893	14	34.7	9	8.2	14	5.1	9	1	2	5	26	14	29.6
Meade	a 13	1899	13	33.2	10	7.8	13	4.5	10	....	.....	6	38.5	13	28.7
Miner	a 1	1900	1	21	1	6	1	6	1	....	.....	....	.....	1	15
	b 4	1895	6	382.5	6	341.7	6	341.7	6	....	.....	....	.....	6	40.8
Minnehaha	a 16	1895	20	26.9	19	8.6	19	7.6	18	5	15	10	27.5	20	19
	b 10	1895	15	134.2	11	37	13	48.9	9	....	.....	....	.....	15	83.8
Moody	a 7	1893	8	50.2	7	25.4	8	15.7	7	....	.....	2	62	8	34.5
	b 3	1902	6	214.3	4	175	6	180.2	4	....	.....	1	4	6	34.2
Pennington	a 11	1901	13	19.5	11	10.5	13	8.2	11	1	3	4	21	13	11.4
Perkins	a	.....	1	34	1	8	1	4	1	....	.....	1	4	1	30
Potter	a 3	1898	6	40	3	33	6	19	3	....	.....	....	.....	6	21
	b	.....	2	1,825	2	1,825	2	1,825	2	....	.....	....	.....	2	0

SOUTH DAKOTA—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Pi-state.	Rise.		Fall.		Water Table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean,
Roberts	*a* 4	1892	9	61.1	6	14.7	9	13.3	6	2	5	1	2	9	47.9
	b	.....	1	140	....	.....	1	30	0	....	.....	....	.....	1	110
Sanborn	*a* 4	1892	5	25.8	3	11	5	10.4	3	....	.....	....	.....	5	15.4
	b 11	1902	17	499.4	15	548.7	17	495.5	15	....	.....	1	8	17	3.9
Spink	*a* 10	1900	15	29.8	12	6.4	13	6.9	10	3	14	2	6	15	23.2
	b 4	1903	12	940.4	12	940.4	12	940.4	12	....	.....	....	.....	12	0
Stanley	*a* 13	1906	14	23.3	13	4.8	14	3.2	13	....	.....	5	20	14	20.1
Sully	*a* 5	1897	5	33.2	5	4.5	5	4.7	5	2	1	....	.....	5	23.5
	b 1	1908	1	1,700	1	1,600	1	1,600	1	....	.....	....	.....	1	100
Turner	*a* 6	1898	9	21.8	5	12.4	9	6.6	5	....	.....	3	28	9	15.2
	b 12	1895	15	140.9	12	80.1	12	59.8	9	....	.....	....	.....	15	68.2
Union	*a* 9	1896	13	27.5	9	7.5	13	6.1	9	....	.....	5	15.5	13	21.5
	b 2	1902	2	97.5	2	35	2	35	2	....	.....	....	.....	2	62.5
Walworth	*a* 7	1902	7	78.1	6	34.5	7	30	6	....	.....	2	4	7	48.1
Yankton	*a* 8	1893	10	35.3	7	10.6	10	8.4	7	....	.....	5	8.5	10	26.8
	b 4	1897	10	289.8	10	279.5	10	273.5	10	....	.....	2	60	10	16.3
Total	*a* 370	1897.3	485	36.7	378	12.2	469	10.1	362	36	133.5	156	792.5	485	26.4
	b 169	1900.2	281	516.1	232	530.1	267	485.6	219	3	26.0	19	387.0	280	46.0
Aggregate	539	1898.2	766	.....	610	.....	736	.....	581	39	159.5	175	1,179.5	765	33.5

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Armstrong	1	.....	1	.....	.....	....	1	Jerauld	4	6	3	1	2	....	12
Aurora	4	3	8	.....	1	1	13	Kingsbury	8	8	1	3	9	2	23
Beadle	6	4	10	2	1	....	17	Lake	7	1	4	5	3	7	20
Bonhomme	5	3	4	3	2	1	13	Lawrence	2	.....	4	.....	.....	....	4
Brookings	7	2	4	6	3	3	18	Lincoln	4	2	4	.....	3	2	11
Brown	7	11	10	2	1	....	24	Lyman	6	4	9	3	.....	....	16
Brule	5	5	5	1	.....	1	12	Marshall	7	6	10	1	1	....	18
Buffalo	1	.....	3	.....	.....	....	3	McCook	4	1	2	2	4	1	10
Butte	2	2	4	.....	.....	....	6	McPherson	4	.....	10	2	2	....	14
Campbell	1	1	5	10	5	....	21	Meade	5	2	9	1	.....	1	13
Charles Mix	7	6	5	2	1	2	16	Miner	3	2	1	1	3	....	7
Clark	5	7	1	1	3	....	12	Minnehaha	12	3	17	4	7	4	35
Clay	8	7	4	5	4	3	23	Moody	5	2	4	5	3	....	14
Codington	4	.....	6	5	.....	....	11	Pennington	5	4	9	.....	.....	....	13
Custer	3	2	5	1	1	....	9	Perkins	1	.....	1	.....	.....	....	1
Day	4	2	5	2	.....	2	11	Potter	2	2	5	1	.....	....	8
Deuel	6	3	8	3	2	1	17	Roberts	4	.....	2	4	3	1	10
Douglas	9	5	5	1	7	10	28	Sanborn	6	16	6	.....	.....	....	22
Edmunds	4	11	2	.....	.....	....	13	Spink	10	14	11	2	.....	....	27
Fall River	7	3	8	4	.....	1	16	Stanley	6	2	9	3	.....	....	14
Faulk	6	14	2	4	.....	....	20	Sully	2	1	3	.....	2	....	6
Gregory	5	3	10	1	.....	....	14	Turner	8	3	8	9	1	3	24
Hamlin	3	4	2	3	1	....	10	Union	5	1	9	4	1	....	15
Hand	6	7	1	7	1	2	18	Walworth	3	....	1	5	1	....	7
Hanson	3	7	1	1	.....	....	9	Yankton	6	9	7	2	1	1	20
Harding	2	.....	4	1	1	....	6								
Hughes	2	2	1	.....	2	....	5	54 counties	263	214	284	129	86	52	765
Hutchinson	5	3	8	4	1	1	17	Per cent	....	28.0	37.1	16.9	11.2	6.8	....
Hyde	6	8	3	2	3	2	18								

Reporters' remarks:

Armstrong County: "All wells have less water; a few have gone dry." Aurora County: "Two artesian wells have quit flowing and have been abandoned." "Deep drilled wells were all flowing; not one-third are flowing at present." "One spring has been failing slowly for at least 25 years." Beadle County: "Surface wells gave out 12 or 14 years ago; most wells now are artesian." "The water level in wells is so much affected by artesian water, changing as the water is turned on or off, that measurements would be misleading." "A spring has been running 26 years." Brookings County: "All dug wells abandoned several years ago on account of giving out." "The

water level has dropped 4 or 5 feet, owing to dry season." Brown County: "Some of the surface wells are almost dry." Brule County: "Water in almost every case is higher in late years." Buffalo County: "Shallow wells got easier than in former years; several artesian wells have gone dry." Clark County: "In 1894 all shallow wells went dry." "Stage of water in wells varies according to stage of water in lakes." Codington County: "Wells which in the nineties were good, are now entirely dry." Custer County: "Wells failing and none getting stronger; water supply has not improved in 25 years." "Several springs have failed, also the creeks are nearly dry; the country is drier than for 10 years." "A number of wells have had to be dug deeper this season." Day County: "In low valleys dry seasons do not affect the ground water; on high places they do." Deuel County: "Water is getting scarce all over the country; wells that used to contain 40 or 50 feet of water are getting down to 10 feet." Douglas County: "Water in tubular and shallow wells along streams has been unfailing; flowing wells mostly give out in a few years." "An artesian well made 14 years ago was first a good flowing well; after 4 years it quit running and now seems to be a dry hole." Fall River County: "Ninety per cent of dug wells have the water line lowered and flow very weak, which was not known before; two wells and a spring have failed." "Water is affected by drought or possibly by cultivation; some wells dry, and some retain water; from some cause water is growing less." Hand County: "The water supply is permanent, uniform, and abundant." Hyde County: "There is an abundance of water." "From 1905 to 1909 the seasons were wet and the water in shallow wells rose." Jerauld County: "Water seems much easier to get than in early days." "Artesian wells are gradually failing in flow and pressure." Kingsbury County: "Artesian wells flow for a year or two, a few longer, and then become pump wells." Lincoln County: "Many shallow wells have been abandoned and deep wells put down." "All dug wells are getting lower, owing to drought." Lyman County: "For water supply for stock a dam is built across a ravine; the ground becomes filled near the dam, and a surface well below will furnish water many months after the reservoir has gone dry." McCook County: "A number of deep wells are going dry." Meade County: "Our springs are drying up about one-half." "Many wells are going entirely dry." "Springs have broken out in various places during the past 2 years, but most of them are now dry." Minnehaha County: "Have had 8 years of excessive rainfall; the ground is full of water." "As yet the dry season has not lowered any of the wells." "No scarcity of water in the last 15 years." "Shallow wells abandoned 15 or 20 years ago because of failure; 30 years ago could get water anywhere from 10 to 30 feet, but not so now." Pennington County: "The level of water in wells 20 to 28 years old is rather higher now than when dug." Spink County: "There ought to be a law making the reduction of artesian flow small as possible." "Artesian pressure reduced with increase of wells from 150 to 100 pounds." "As a rule wells have more water than 15–20 years ago; no noticeable shrinkage of water in wells during the present dry year." Stanley County: "A great many wells and springs have failed or nearly so." "Water supply from dams; we build a dam and dig a hole beside it and call it a well." "A great many wells are failing." Turner County: "Dry seasons have little influence on the supply; deep wells not affected at all." "A spring has run continuously for 8 years; previously it started to flow in the fall and ceased in the spring." Walworth County: "Not much change in wells and springs." "In most wells water is lower than a few years ago." Yankton County: "In the dry years of 1893–97 most of the surface wells failed; the water level of the deep wells seems to be going down."

Both the remarks and the schedule records indicate on the whole a decided lowering in the well-water level in most of the counties. In several counties the diminution in head of flowing wells is particularly noteworthy, indicating that current use already exceeds the natural supply.

TENNESSEE.

EASTERN.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Anderson	a	2	1875	2	22.5	....	.....	2	4.5	0	....	.....	....	.....	2	18
Bledsoe	a	5	1896	8	29.1	3	13.3	8	5.9	3	....	.....	2	12	8	23.2
	b	1	1905	3	66.7	3	32.7	3	20.7	3	....	.....	2	36	3	46
Blount	a		.....	2	32.5	1	38	2	25	1	....	.....	1	3	2	7.5
	b	2	1908	3	153	1	45	3	96.7	1	....	.....	1	5	3	56.3
Bradley	a	6	1886	6	32	6	7.7	6	6.7	6	2	6	2	11.5	6	25.2
Campbell	a	9	1878	9	42.6	5	9	9	7.8	5	....	.....	1	1	9	34.8
	b	2	1909	2	76	2	48.5	2	48.5	2	....	.....	....	.....	2	27.5
Carter	a	3	1904	3	53.3	3	13.3	3	12	3	....	.....	2	4	3	41.3
Claiborne	a	2	1899	2	30.5	....	.....	2	4.5	0	....	.....	....	.....	2	26
	b	1	1901	1	61	....	.....	1	12	0	....	.....	....	.....	1	49
Cocke	a	3	1891	3	18.7	3	3.3	3	1.3	3	....	.....	2	6	3	17.3
	b	1	1910	1	75	1	10	....	.....	0	....	.....	....	.....	1	65
Cumberland	a	8	1894	10	34.5	10	10	10	7.3	10	....	.....	7	26	10	27.1
	b	5	1902	6	104	6	22.3	6	22	6	....	.....	1	2	6	82
Franklin	a	1	1835	3	48.3	2	13	3	5	2	....	.....	2	16	3	43.3
	b	1	1901	1	75	....	.....	1	20	0	....	.....	....	.....	1	55
Grainger	a	2	1910	2	42.5	2	9	....	.....	0	....	.....	....	.....	2	33.5
Greene	a	9	1895	9	37	9	13.3	9	13.3	9	....	.....	....	.....	9	23.7
Grundy	a	2	1904	7	45	2	10.5	7	20.3	2	....	.....	1	2	7	24.7
	b	1	1910	3	88.3	1	30	2	75	0	....	.....	....	.....	3	28.3
Hamblen	a	2	1892	4	38.6	....	.....	4	11.6	0	....	.....	....	.....	4	27
	b	4	1906	4	95.5	3	40.3	4	46.5	3	....	.....	2	4	4	49
Hamilton	a	3	1849	3	37	3	9.7	3	9.7	3	....	.....	....	.....	3	27.3
Hancock	a	2	1898	5	23.8	5	8.4	5	8.4	5	....	.....	....	.....	5	15.4
	b	3	1906	3	69.5	3	19.8	3	19.7	3	....	.....	1	0.5	3	49.8
Hawkins	a	6	1905	10	42.9	6	29.3	10	20.3	6	2	3	2	16	10	22.5
	b		.....	1	100	....	.....	1	50	0	....	.....	....	.....	1	50
James	a	4	1890	4	46	4	7.2	4	7.2	4	....	.....	....	.....	4	38.7
	b		.....	1	70	....	.....	1	13	0	....	.....	....	.....	1	57
Jefferson	b	3	1904	3	70.3	3	30.7	....	.....	0	....	.....	....	.....	3	39.7
Johnson	a	13	1885	19	35.4	14	13.6	16	10	11	....	.....	3	24.5	19	24.9
	b	3	1906	3	132	3	48.3	3	48.3	3	....	.....	....	.....	3	83.7
Knox	a	11	1892	14	32.6	10	12.3	11	7.4	7	1	2	3	7	14	22.1
	b	8	1907	9	104.4	5	35	9	24.1	5	....	.....	2	20	9	80.3
Loudon	a		.....	2	25	1	20	2	10	1	....	.....	1	5	2	15
	b	2	1901	3	113.7	3	57	3	51.3	3	....	.....	2	17	3	62.3
Marion	a	5	1889	10	29.9	8	9	10	5.5	8	....	.....	7	26	10	24.4
McMinn	a	3	1876	4	50	3	12.7	4	11.5	3	....	.....	1	10	4	38.5
Meigs	a	6	1905	6	32.7	6	13.5	6	8.8	6	....	.....	5	28	6	23.8
Monroe	a	4	1888	6	27.8	6	6.7	6	3.3	6	....	.....	4	20	6	24.5
Morgan	a	3	1895	3	26	3	4.7	3	4.7	3	....	.....	....	.....	3	21.3
Polk	a	3	1857	7	45.6	7	7	7	4.6	7	....	.....	5	17	7	41
	b	1	1902	2	114	2	21.5	2	19	2	....	.....	1	5	2	95
Rhea	a	9	1893	9	39.4	9	7.9	9	5.7	9	....	.....	9	20	9	33.8
Roane	a	7	1888	9	42.6	9	13.9	8	12.9	8	....	.....	3	11.5	9	29.9
Scott	a	3	1895	3	32	3	11.8	3	9.3	3	....	.....	3	7.5	3	22.7
Sequatchie	a	3	1894	3	37	3	25	3	13.3	3	....	.....	3	35	3	23.7
Sevier	a	12	1895	14	35.8	9	9.6	14	7.9	9	....	.....	8	23.5	14	27.9
Sullivan	a	4	1869	4	55	3	3.8	4	4.1	3	....	.....	....	.....	4	50.9
	b	1	1910	1	135	1	30	....	.....	0	....	.....	....	.....	1	105
Union	a	4	1897	6	36.5	6	4.8	6	3.6	6	....	.....	4	7.5	6	32.9
Washington	a	2	1891	2	32	2	19	2	20	2	1	2	....	.....	2	12
	b	1	1904	1	120	1	40	1	50	1	1	. 10	....	.....	1	70
Total	a	161	1889.8	213	36.6	166	11.3	204	9.1	157	6	13.0	81	340.0	213	27.3
	b	40	1905.5	51	98.9	38	34.0	45	37.2	32	1	10.0	12	89.5	51	62.9

MIDDLE.

Bedford	a	5	1885	6	31.7	5	18	6	14.7	5	....	.....	1	7	6	17
	b	4	1892	9	124.6	7	87.1	6	86.1	4	....	.....	2	78	9	60.4
Cannon	a	3	1904	3	35.7	3	4.7	3	3.7	3	1	1	2	4	3	32
Cheatham	a	5	1889	9	33.8	6	11.5	9	8.8	6	....	.....	2	12	9	25
	b	5	1898	6	126.2	4	27.5	5	22.4	3	....	.....	....	.....	6	106.2
Clay	a	5	1893	6	29.3	5	9.4	6	8.5	5	....	.....	2	4	6	20.8
	b	4	1904	5	86	4	16	2	11	1	....	.....	1	6	5	72
Coffee	a	6	1870	6	30	6	13.7	6	11.3	6	1	2	3	16	6	18.7
Davidson	a	3	1898	5	36.8	3	18.7	5	16.2	3	....	.....	....	.....	5	20.6
Dekalb	a		.....	3	41.7	....	.....	3	7.7	0	....	.....	....	.....	3	34
Dickson	a	9	1886	10	40.8	10	4.4	10	3.7	10	....	.....	7	6.5	10	37
	b		.....	1	218	1	158	1	158	1	....	.....	....	.....	1	60
Fentress	a	3	1891	4	28	3	8.7	4	7	3	....	.....	....	.....	4	21
Giles	a	7	1894	12	27.7	7	7.9	12	6.1	7	....	.....	6	11.5	12	21.6
	b	2	1896	3	77.3	2	20	3	18.3	2	....	.....	1	5	3	59
Houston	a	5	1887	7	28.9	6	4.7	7	3.4	6	....	.....	3	6	7	25.4
Humphreys	a	9	1867	9	37	9	4.5	9	3.4	9	....	.....	7	9.5	9	33.6

TENNESSEE—Continued.

MIDDLE—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Jackson	a 6	1899	14	46	9	8.3	14	7.9	9	....	.....	7	11.5	14	38.1
	b 1	1900	2	100	1	30	2	32.5	1	....	.....	1	5	2	67.5
Lawrence	a 10	1889	11	37	9	3.9	11	3.9	9	....	.....	4	2	11	33.1
Lincoln	a 3	1887	7	52.9	3	18.7	7	11.4	3	....	.....	2	8.5	7	41.5
Macon	a 6	1898	6	48.3	6	7.3	6	6.5	6	....	.....	2	5	6	41.8
Marshall	a 5	1879	8	32.1	6	17.2	7	12.6	5	....	.....	3	9	8	19.9
	b 3	1895	6	115	4	48.7	5	60	3	....	.....	1	5	6	60.8
Maury	a 1	1909	1	18	1	5	1	4	1	....	.....	1	1	1	14
	b 5	1901	6	73.2	6	38.8	5	37.6	5	....	.....	3	17	6	37.2
Montgomery	a 6	1865	7	41.3	2	4.5	7	10.2	2	....	.....	1	0.5	7	31.1
	b 2	1902	2	129.5	2	55	2	55	2	....	.....	....	.....	2	74.5
Overton	a 6	1889	8	30.2	7	5.3	4	4.7	3	....	.....	....	.....	8	26.4
	b 2	1907	2	165	2	40	2	40	2	....	.....	....	.....	2	125
Perry	a 3	1880	6	27.8	6	8.3	6	7.3	6	....	.....	1	6	6	20.5
Pickett	a 4	1901	4	32	4	4.2	3	3.7	3	....	.....	3	4	4	28.7
Putnam	a 4	1889	4	31	4	9.5	4	7.2	4	....	.....	3	9	4	23.7
Robertson	a 3	1857	3	36	1	5	3	4	1	....	.....	1	3	3	32
	b 4	1904	7	78.6	5	27.4	7	24.1	5	....	.....	....	.....	7	54.5
Rutherford	a 2	1887	2	52.5	2	25	2	20	2	....	.....	1	10	2	32.5
	b	.....	6	72.5	3	18.3	6	17.7	3	....	.....	2	15	6	54.8
Smith	a	.....	3	45.7	....	.....	3	4	0	....	.....	....	.....	3	41.7
	b 1	1900	3	82	1	40	3	19	1	....	.....	....	.....	3	63
Stewart	a 3	1867	3	14.7	3	4	3	2	3	....	.....	3	6	3	12.7
Sumner	a 3	1873	7	33.1	3	10.7	7	4.6	3	....	.....	3	19	7	28.6
	b	.....	1	100	....	.....	1	25	0	....	.....	....	.....	1	75
Warren	a 6	1895	6	32.1	6	5	6	3	6	....	.....	6	12	6	29.1
Wayne	a 9	1898	9	48.8	9	7.3	9	5.5	9	....	.....	4	16	9	43.3
White	a 4	1883	4	40.7	4	13.2	4	10.7	4	....	.....	2	10	4	30
Williamson	a 3	1888	4	30	3	10	4	7.5	3	....	.....	2	4	4	22.5
Wilson	a 2	1895	3	41.7	3	13.3	4	10.3	3	....	.....	1	9	3	31.3
	b	.....	1	125	1	60	1	60	1	....	.....	....	.....	1	65
Total	a 149	1886.4	200	36.3	154	8.7	195	7.2	148	2	3.0	83	222.0	200	29.1
	b 33	1899.8	60	102.2	43	44.7	51	39.7	34	0	0.0	11	131.0	60	65.7

WESTERN.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Benton	a 6	1894	11	37	8	8.1	11	5.7	8	....	.....	3	13	11	31.3
Carroll	a 5	1895	8	42.7	3	12.7	8	4.8	3	....	.....	3	20	8	37.9
	b 9	1896	14	84.6	4	11	14	14.2	4	....	.....	4	9.5	14	70.3
Chester	a 1	1870	1	52	1	2.5	1	2.5	1	....	.....	....	.....	1	49.5
	b 2	1892	2	70.5	2	11	2	11	2	....	.....	....	.....	2	59.5
Crockett	a 3	1902	4	34.7	3	12.7	4	8.7	3	....	.....	1	8	4	26
	b 3	1909	4	69.7	....	.....	4	13.2	0	....	.....	....	.....	4	56.5
Decatur	a 3	1881	3	29.3	3	3.7	3	3.5	3	....	.....	1	0.5	3	25.8
Dyer	a 6	1877	10	29.6	8	9.1	10	5.1	8	....	.....	7	37	10	24.5
Fayette	a 2	1870	2	60.5	2	7	2	5	2	....	.....	2	4	2	55.5
	b 4	1907	4	170.2	4	29.5	3	22.7	3	....	.....	....	.....	4	140.7
Gibson	a 11	1893	16	40.8	7	9.6	16	9.4	7	....	.....	....	.....	16	31.4
	b 2	1900	4	210	2	210	4	145	2	....	.....	....	.....	4	65
Hardeman	a	.....	3	50	3	5.5	3	5.5	3	....	.....	....	.....	3	44.5
	b	.....	4	137.5	1	3	4	22	1	....	.....	....	.....	4	115.5
Hardin	a 8	1891	11	45.5	11	8.7	8	3.5	8	....	.....	6	12	11	38.7
Haywood	a 3	1873	4	29.5	3	6.7	4	5	3	....	.....	1	5	4	24.5
Henderson	a 11	1890	21	35.3	13	6.5	21	5.6	13	....	.....	6	10	21	29.7
	b	.....	3	96	2	50	3	35	2	....	.....	2	15	3	61
Henry	a 4	1899	4	43.7	1	6	4	6.2	1	....	.....	....	.....	4	37.5
	b 2	1907	2	101	2	11.5	2	11	2	....	.....	1	1	2	90
Lake	a	.....	12	30.8	....	.....	12	5.8	0	....	.....	....	.....	12	25
Lauderdale	a	.....	6	45.8	....	.....	6	8.3	0	....	.....	....	.....	6	37.5
	b 3	1900	5	116	3	20	5	32	3	....	.....	....	.....	5	84
Madison	a 2	1900	2	35	2	7	1	2	1	....	.....	1	2	2	29
	b 4	1904	7	98.3	4	14.5	6	30	3	....	.....	2	6	7	70.9
McNairy	a 4	1885	11	29.8	2	5	11	8.1	2	1	1	....	.....	11	21.7
	b	.....	7	191.9	....	.....	7	127.1	0	....	.....	....	.....	7	64.7
Obion	a 12	1899	16	43.9	13	13	14	12.1	11	....	.....	6	15	16	32.7
	b 3	1909	4	108.2	4	52.7	2	49.5	2	....	.....	....	.....	4	55.5
Shelby	a 7	1877	7	52.9	7	10.4	6	8.5	6	....	.....	4	16	7	44.7
	b 3	1904	8	118.1	3	63.3	7	15	2	....	.....	....	.....	8	83.7
Tipton	a 7	1880	7	60.1	6	7.7	7	4.9	6	....	.....	5	17	7	55.3
Weakley	a 5	1906	7	62.3	1	5	7	10.9	1	....	.....	....	.....	7	51.4
Total	a 100	1889.6	166	40.7	97	8.7	159	7.0	90	1	1.0	46	159.5	166	33.6
	b 35	1901.9	68	119.9	31	40.3	63	40.9	26	0	0.0	9	31.5	68	77.0
State total	a 410	1888.5	579	37.7	417	9.7	558	7.9	395	9	17.0	210	721.5	579	29.7
	b 108	1902.6	179	108.0	112	39.8	159	39.4	92	1	10.0	32	252.0	179	69.2
Aggregate	518	1891.5	758	.....	529	.....	717	.....	487	10	27.0	242	973.5	758	39.0

TENNESSEE—Continued.

PROPORTIONATE DEPTHS—EASTERN.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Anderson	1	....	2	....	....	....	2	Knox	9	1	11	5	5	1	23
Bledsoe	4	1	7	3	....	....	11	Loudon	2	....	3	....	2	....	5
Blount	2	1	1	2	1	....	5	McMinn	2	....	2	1	1	....	4
Bradley	2	2	1	3	....	....	6	Marion	4	....	8	2	....	....	10
Campbell	4	1	5	4	1	....	11	Meigs	2	....	5	1	....	....	6
Carter	1	....	....	3	....	....	3	Monroe	4	....	4	2	....	....	6
Claiborne	1	....	2	1	....	....	3	Morgan	1	....	3	....	....	....	3
Cocke	2	....	3	....	1	....	4	Polk	3	....	3	2	4	....	9
Cumberland	6	....	8	5	2	1	16	Rhea	3	....	5	3	1	....	9
Franklin	1	....	....	4	....	....	4	Roane	4	....	5	4	....	....	9
Grainger	1	....	1	1	....	....	2	Scott	1	....	3	....	....	....	3
Greene	3	1	5	3	....	....	9	Sequatchie	1	....	2	1	....	....	3
Grundy	2	....	8	2	....	....	10	Sevier	4	1	8	4	1	....	14
Hamblen	3	....	4	3	1	....	8	Sullivan	1	....	1	1	2	1	5
Hamilton	1	....	2	1	....	....	3	Union	2	....	4	1	1	....	6
Hancock	3	1	4	3	....	....	8	Washington	1	....	2	....	1	....	3
Hawkins	5	....	8	3	....	....	11								
James	2	....	1	4	....	....	5	36 counties	96	10	145	80	25	4	264
Jefferson	1	....	1	2	....	....	3	Per cent	....	3.8	54.9	30.3	9.5	1.5	....
Johnson	7	1	13	6	1	1	22								

PROPORTIONATE DEPTHS—MIDDLE.

Bedford	4	1	5	7	2	....	15	Montgomery	4	....	5	2	1	1	9
Cannon	1	....	1	2	....	....	3	Overton	3	1	5	2	....	2	10
Cheatham	5	....	8	1	3	3	15	Perry	2	....	5	1	....	....	6
Clay	4	....	5	2	4	....	11	Pickett	2	....	3	1	....	....	4
Coffee	2	....	6	....	....	....	6	Putnam	2	....	3	1	....	....	4
Davidson	2	....	4	1	....	....	5	Robertson	3	....	2	6	2	....	10
Dekalb	1	....	1	2	....	....	3	Rutherford	3	....	1	5	2	....	8
Dickson	4	....	5	6	....	....	11	Smith	2	....	....	4	2	....	6
Fentress	2	....	3	1	....	....	4	Stewart	1	3	....	....	....	....	3
Giles	5	1	7	5	2	....	15	Sumner	3	....	3	4	1	....	8
Houston	3	....	3	4	....	....	7	Warren	2	....	3	3	....	....	6
Humphreys	3	1	5	1	1	1	9	Wayne	3	2	3	1	3	....	9
Jackson	6	....	5	8	3	....	16	White	2	....	3	1	....	....	4
Lawrence	4	1	4	5	1	....	11	Williamson	2	....	3	1	....	....	4
Lincoln	2	....	2	5	....	....	7	Wilson	2	....	2	1	1	....	4
Macon	2	....	1	5	....	....	6								
Marshall	5	....	9	3	1	1	14	33 counties	94	12	117	93	30	8	260
Maury	3	2	2	2	1	....	7	Per cent	....	4.6	45.0	35.8	11.5	3.1	....

PROPORTIONATE DEPTHS—WESTERN.

Benton	4	2	4	4	1	....	11	Henry	2	....	1	3	1	1	6
Carroll	10	1	3	8	10	....	22	Lake	4	....	10	2	....	....	12
Chester	1	....	....	2	1	....	3	Lauderdale	4	....	2	5	3	1	11
Crockett	4	....	3	4	1	....	8	Madison	3	....	2	4	1	2	9
Decatur	1	....	2	1	....	....	3	McNairy	4	3	6	5	4	....	18
Dyer	4	....	8	2	....	....	10	Obion	7	....	9	7	4	....	20
Fayette	2	....	....	2	1	3	6	Shelby	5	....	3	3	7	2	15
Gibson	5	....	10	8	2	....	20	Tipton	2	....	1	3	3	....	7
Hardeman	3	....	....	2	2	3	7	Weakley	3	....	1	5	1	....	7
Hardin	4	....	4	6	1	....	11								
Haywood	1	1	2	1	....	....	4	21 counties	79	8	83	85	46	12	234
Henderson	6	1	12	8	3	....	24	Per cent	....	3.4	35.5	36.3	19.7	5.1	....

Reporters' remarks:

Cocke County: "Several springs started within 10 years." Knox County: "The main difficulty with the water supply is from springs becoming covered by washings from the hillsides." Meigs County: "Some wells are discarded." Bedford County: "A big spring dry at present has not been dry before in 50 years." Clay County: "Springs are weaker." Humphreys County: "Old people think wells generally have subsided." "More than one spring has been abandoned because of failure of supply; the general opinion is that wells, springs, and streams especially are failing slowly." Montgomery County: "Many springs have gradually given out; water

level is much lower than 20 years ago; creeks are small and shallow to what they once were." Steward County: "A fine spring fails in summer." Crockett County: "There were a few springs in this section 50 years ago; they have mostly gone dry." Dyer County: "The depth of dug wells 40 years ago ran from 10 to 20 feet, now from 25 to 120 feet." Henderson County: "While the water level has changed but little, the quantity is much less." "Two springs have gone dry." Shelby County: "The water supply has gradually decreased for the past 20 years; nine out of ten springs that flowed all the year have gone dry; wells that stood 8 feet in water 10 years ago will hardly average 5 feet now."

Other remarks ascribed exceptionally high-water level in some wells to recent rains; yet the schedule records of 758 wells in the State indicate a minimum mean lowering of over 1 foot per decade, corresponding fairly with the figures for neighboring States.

TEXAS.

County.	Dates.			Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Anderson	a	3	1885	6	40.8	3	9	6	5.9	3			2	5.5	6	34.8
	b			1	100			1	30	0					1	70
Angelina	a	1	1890	3	18			3	5.7	0					3	12.3
Archer	a	1	1900	2	32.5			2	6.5	0					2	26
	b			2	100	2	20			0					2	80
Atascosa	a	3	1890	5	56	2	4.7	4	9.6	1					5	47.1
	b	1	1903	3	175	3	175	3	175	3					3	0
Austin	a	12	1890	15	46.9	11	5.8	15	4.3	11	1	1	6	22	15	42.6
	b	5	1895	5	86.6	5	14.4	5	12.8	5	2	7	1	15	5	72.8
Bastrop	a	3	1893	9	43.9	3	6.3	8	5.2	2			2	8	9	38.8
	b			5	119			5	20	0					5	99
Bee	a	2	1904	4	56.2	3	9.3	3	8.3	2			1	3	4	48.2
	b	1	1900	4	162.7	3	43.3	3	45	2	1	25	1	10	4	121.5
Bell	a	3	1890	5	24.6	3	5.3	5	5.4	3					5	19.2
	b	1	1886	4	191.7	3	225.7	4	170.5	3					4	21.2
Bexar	a	11	1882	14	53.3	7	5.1	14	5	7					14	48.3
	b	20	1902	27	239.1	13	214.1	21	128.1	13			7	702	21	142.1
Blanco	a	3	1893	4	41.5	4	6.2	4	6.2	4	1	6	2	6	4	35.2
	b	5	1897	5	200.8	5	60	5	59	5	1	5	1	10	5	141.8
Bosque	a	5	1893	11	23.8	5	2.9	11	3.2	5					11	20.6
	b	4	1902	9	363.9	5	423	9	307	5					9	56.9
Bowie	a	12	1897	15	40.9	8	10.6	15	9.1	8	1	2	2	14	15	23.9
Brazoria	a	12	1903	25	33	13	17.4	25	12.6	13	2	1	1	22	25	10.4
	b	3	1908	6	363.2	5	383	6	357.5	5					6	5.8
Brazos	a			2	15			2	3.5	0					2	11.5
	b	6	1905	6	79.3	6	21.5	6	19.2	6	3	36	2	50	6	60.2
Brown	a	2	1885	3	28	2	4	2	5.5	1					3	23.3
	b	7	1905	8	133.5	6	60.3	5	69	3					8	80.7
Burleson	b	2	1908	2	160	2	142.5	2	142.5	2					2	17.5
Burnet	a	4	1887	4	33.2	4	9.5	4	8.7	4			1	3	4	24.5
	b	4	1903	11	131.5	10	70.8	10	69.6	9					11	63.5
Caldwell	a	5	1891	11	31.9	9	6.3	11	6.5	9			1	1	11	25.5
Callahan	a	4	1905	5	25	5	3.3	4	1.9	4			3	4	5	22.5
Cameron	a	1	1907	5	21.8	1	8	5	5	1					5	16.8
	b			2	750	2	750	2	750	2					2	0
Camp	a	1	1897	2	25.5	2	5	2	4	2			2	2	2	21.5
Cass	a	9	1884	10	34.4	9	3.8	10	5.2	9	5	15	1	1	10	29.1
Castro	b	3	1897	3	144.3	3	16.3			0					3	128
Cherokee	a	14	1901	16	35.4	16	5.5	16	4.4	16			6	17.5	16	31
Childress	b	3	1903	5	89.6	5	31	5	31	5					5	58.6
Clay	a	5	1895	8	29	5	6.2	7	4.6	4			2	2	8	23.7
	b			3	136	1	12	2	67.5	0					3	87
Coke	a			1	35			1	5	0					1	30
	b	1	1888	4	112.5	3	15	4	17.5	3					4	95
Coleman	b	1	1910	4	139.2	1	20	4	17.5	1			1	20	4	121.7
Collin	a	7	1885	11	25	6	7.9	11	5.5	6			1	3.5	11	19.5
	b	4	1904	5	1,900			5	1,600	0					5	300
Collingsworth	a	2	1905	2	67.5	2	7	2	8	2	1	2			2	59.5
	b	5	1906	5	126.4	4	28.7	5	29	4			1	10	5	97.4
Colorado	a	6	1879	6	45.3	5	13.4	6	12.2	5			1	0.5	6	33.1
Comal	a	2	1893	3	39.3	3	10.3	3	9	3			1	4	3	30.3
	b	7	1898	9	247.2	8	89.1	9	107.8	8			6	92	9	139.4
Comanche	a	3	1884	6	50	3	9.3	6	10.2	3					6	39.8
	b	7	1904	9	128.3	2	15	9	32.8	2					9	95.6

TEXAS—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Concho	a	3	1908	4	30	3	7	4	5.2	3			1	5	4	24.7
	b	4	1906	4	82.5	4	28.2	4	28.2	4					4	54.2
Cooke	a	5	1888	5	47.8	3	3.5	5	2.8	3			1	1	5	45
	b	3	1894	3	139	3	56.7	3	48.3	3			1	25	3	90.7
Coryell	a	4	1896	7	32.9	4	24.5	7	14	4			1	10	7	18.9
	b	17	1897	19	153	17	102.5	19	88	17			6	90	19	65
Crosby	b	3	1889	3	113.3	3	20	3	20	3					3	93.3
Dallam	b			2	300			2	26	0					2	294
Dallas	a	18	1890	18	24.3	16	7.6	18	6.5	16			5	21	18	17.8
	b	3	1901	3	401.7	3	310	3	292	3			2	54	3	109.7
Dawson	a	1	1903	1	41	1	8	1	8	1					1	33
	b	2	1906	2	106	2	26.5	2	26.5	2					2	79.5
Delta	a	4	1887	5	40	3	13.7	5	11.6	3			3	23	5	28.4
	b	1	1900	2	160			2	37.5	0					2	122.5
Denton	a	11	1890	13	28.8	12	8.3	12	4.4	11			7	19.5	13	22.4
	b	2	1900	7	331	5	378.4	6	298.2	4			1	8	7	32.6
De Witt	a	8	1872	8	51.2	8	8	8	6.6	8			4	11.5	8	44.7
	b	4	1897	4	94.2	2	20	4	30.5	2			1	8	4	63.7
Dickens	a	1	1905	1	35	1	16	1	5	1			1	11	1	30
	b	1	1908	1	80	1	20	1	16	1			1	4	1	80
Duval	a	1	1877	1	60	1	20	1	20	1					1	40
	b	3	1902	3	163.7	3	130.3	3	130.3	3					3	33.3
Eastland	a	11	1897	16	43.8	10	7	16	7.6	10	1	17			16	36.2
	b	2	1891	3	109	2	22.5	3	16.7	2					3	92.3
Edwards	b	4	1905	4	394	3	106.7	4	98.7	3					4	295.2
Ellis	a	7	1891	10	24.4	7	9.5	10	4.6	7			5	30	10	19.7
	b	2	1897	3	976.7	3	976.7	3	976.7	3					3	0
El Paso	a	2	1909	3	20.7	3	7.7	2	9.5	2					3	13
	b	2	1897	2	247.5	2	18	2	18	2					2	229.5
Erath	a	4	1874	4	35.5	1	4	4	4.6	1			1	2.5	4	30.9
	b	4	1896	4	143.2	2	70	4	42.5	2					4	100.7
Falls	a	4	1866	7	23.7	3	3.7	7	3.5	3			3	4.5	7	20.2
Fannin	a	5	1889	10	32.6	10	8.7	8	10	8	2	11	1	2	10	23
Fayette	a	10	1894	18	39.2	10	5.4	18	5.9	10	1	2	1	2	18	33.2
	b	5	1898	17	145.6	5	150.2	17	62.8	5	1	2	1	4	17	82.8
Fisher	a			2	30	2	4	2	2	2			2	4	2	28
	b			1	100			1	15	0					1	85
Floyd	a	2	1894	3	44.7	2	13	1	5	0					3	34.3
	b	5	1901	5	149.9	4	18	4	14.4	3					5	134.8
Foard	a	3	1899	3	41.7	2	3	3	8	2	1	15	1	2	3	33.7
	b	2	1892	4	110	4	30			0					4	80
Fort Bend	a	3	1892	7	32.1	4	15.7	7	12.1	4			1	1	7	20
Franklin	a	3	1882	3	38.7			3	3	0					3	35.7
Freestone	a	3	1899	3	20	3	3.7	3	1.7	3			2	6	3	18.3
Frio	b	3	1898	3	107.3	3	54	3	54	3					3	53.3
Galveston	a	4	1896	10	22.6	6	17	10	16.8	6			2	3	10	5.8
	b			5	352	3	520	5	351	3					5	1
Gillespie	a	2	1887	5	29.4	5	9	5	8.4	5			2	3	5	21
	b	7	1901	8	154.1	7	92.4	8	91.5	7					8	62.6
Glasscock	a	2	1896	2	35	2	17	2	17	2					2	18
	b			2	125			2	30	0					2	95
Gonzales	a	6	1883	7	60.1	7	8.1	6	5.7	6			2	2.5	7	52.4
	b	3	1902	5	402	5	368.4	4	410	4			3	162	5	66
Gregg	a	4	1892	6	36.5	5	5.2	6	2.2	5			5	21	6	34.3
Grimes	a	6	1896	17	40.7	3	5.3	17	8.7	3					17	32
Guadalupe	a	3	1886	3	46.7	3	4.3	3	1	3			3	10	3	45.7
Hale	a			3	53			3	7.7	0					3	45.3
	b			2	72			2	15	0					2	57
Hall	a	3	1902	3	24.3	3	5.3	3	5.3	3					3	19
Hamilton	b	6	1901	6	122.7	6	36.7	6	36.7	6					6	86
Hardeman	b	3	1908	3	61.7	3	14.7	3	14.7	3					3	47
Hardin	a	1	1887	3	36.7	3	2.8	3	1	3			3	5.5	3	35.7
Harris	a	7	1900	9	23.2	7	11.9	9	4.9	7			4	49.5	9	18.3
	b	3	1904	3	106.7	3	63.3	3	60	3	1	10	2	20	3	46.7
Harrison	a	9	1883	16	31.7	12	7.2	16	6.8	12	1	1	10	36.5	16	24.9
	b	1	1910	1	150			1	140	0					1	10
Hartley	b			2	300			2	37.5	0					2	262.5
Haskell	a	1	1901	3	66.7	3	15.3	3	11.3	3			2	12	3	55.3
Hays	a	1	1865	1	25	1	4	1	2	1			1	2	1	23
	b	2	1896	2	207.5	2	35	2	50	2	1	30			2	157.5
Hemphill	a	2	1910	2	65			2	4	0					2	61
	b	1	1909	1	450			1	150	0					1	300
Henderson	a	3	1904	3	41	3	8.7	3	8.7	3					3	32.3
Hidalgo	a	2	1910	2	25			2	9	0					2	16
	b	1	1909	1	80	1	50	1	50	1					1	30
Hill	a	7	1883	7	26.3	4	6	7	5.7	4			2	10	7	20.6
	b	1	1890	1	180	1	150	1	150	1					1	30

TEXAS—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Hood	*a* 2	1878	3	45	1	1	3	3.8	1	1	2			3	41.2
	b 3	1897	3	245.2	2	149	3	107.7	2					3	137.5
Hopkins	*a* 3	1873	3	20	3	12	3	12	3					3	8
	b 5	1904	5	93.2	5	33	5	30	5	1	5	3	20	5	63.2
Houston	*a* 3	1899	3	47.3	3	4	3	3.2	3	1	0.5	2	3	3	44.2
Howard	*a* 3	1901	3	28	3	4.3	3	2.7	3			2	5	3	25.3
Hunt	*a* 1	1904	5	33.5			5	5.9	0					5	27.6
	b 4	1902	5	230	1	280	5	161	1					5	69
Jack	*a* 8	1895	9	29.6	9	10.8	9	10.4	9			2	4	9	19.2
Jackson	*a*		1	40			1	5	0					1	35
	b 4	1907	7	392.7	4	385	7	355.7	4					7	37
Johnson	*a* 3	1873	10	30.9	3	9.3	10	6.2	3					10	24.7
	b		7	476.4			1	200	0					1	100
Jones	*a* 4	1889	9	28.9	4	7.6	9	5.2	4			1	3	9	23.6
	b 1	1899	2	75	1	30	2	20	1					2	55
Karnes	*b* 5	1907	6	120.2	6	53.5	6	53.5	6					6	66.7
Kaufman	*a* 12	1887	13	34.8	12	9.7	13	7.5	12			8	27	13	27.3
Kendall	*a* 5	1882	5	37.6	5	3.8	5	2.4	5			5	7	5	35.2
	b 12	1901	19	246.1	16	120.6	16	113.2	13			1	20	19	130.6
Kent	*a*		1	25			1	5	0					1	20
	b 1	1910	1	145			1	80	0					1	65
Kerr	*a* 1	1896	1	30	1	6	1	6	1					1	24
	b 2	1901	2	150.5	2	74.5	2	74.5	2					2	76
Knox	*a* 13	1903	17	36	15	5.6	17	5.8	15	1	2	1	1	17	30.2
	b 1	1892	1	81	1	7	1	9	1	1	2			1	72
Lamar	*a*		2	25	2	10	2	8	2			1	4	2	17
	b 1	1910	5	191.2	4	180	5	162	4					5	29.2
Lamb	*b* 3	1910	3	90	1	20	3	23.3	1					3	66.7
Lampasas	*a* 1	1909	2	25	2	6	2	5	2			1	2	2	20
	b 1	1909	2	212.5	1	130	2	87.5	1					2	125
Lavaca	*a* 6	1885	7	36.3	5	10	7	3.7	5			3	40	7	32.6
	b 3	1905	3	268	1	165	3	221.7	1					3	46.3
Lee	*a* 2	1896	2	43	2	19.5	2	4	2			2	31	2	39
	b 4	1902	7	164.6	4	36	4	39	3	3	16			5	64.4
Leon	*a* 6	1906	6	43.3	6	5	6	5.3	6	1	16	4	14	6	38
Liberty	*a* 3	1910	7	31.9	5	7.8	7	5.8	5			3	6	7	26.2
	b		1	375					0						
Limestone	*a* 6	1874	8	47.7	4	13.7	8	7.1	4			3	30	8	40.6
Lipscomb	*a* 2	1906	2	21.7	2	3.5	2	3.5	2					2	18.2
	b 1	1909	1	104	1	15	1	15	1					1	89
Llano	*a* 1	1904	2	30			2	16.5	0					2	13.5
	b		1	150			1	75	0					1	75
Madison	*b*		1	100	1	30	1	30	1					1	70
Marion	*a* 3	1869	3	25	3	4	3	2.7	3			3	4	3	22.3
Mason	*a* 3	1888	4	23.5	2	4	3	5	1	1	2			4	18.5
	b		3	78.3			3	8.3	0					3	70
Matagorda	*a* 1	1909	2	39	1	20	2	9	1			1	12	2	30
	b 1	1906	10	343.4	8	393.1	10	322.7	8					10	20.7
McCulloch	*a* 3	1895	3	44.7	3	6.3	3	8.3	3	1	6			3	36.3
	b 1	1909	4	107.5	2	65	3	36.7	1					4	55
McLennan	*a* 9	1883	17	20	12	7.6	17	4.4	12			5	37	17	15.6
	b 2	1896	2	1,400	2	1,400	2	1,350	2			1	100	2	50
Menard	*a* 1	1890	1	20	1	8	1	8	1					1	12
	b 5	1899	5	186.8	5	107.4	5	107.4	5					5	79.4
Milam	*a* 6	1894	10	36.2	6	3.9	10	5.6	6	1	13	2	2	10	30.5
Mills	*a*		2	20			2	4	0					2	16
	b 6	1908	8	168	5	70.2	8	65.1	5					8	102.9
Mitchell	*b*		3	118			3	23.3	0					3	94.7
Montague	*a* 1	1907	1	20	1	6	1	6	1					1	14
Montgomery	*a* 3	1899	5	31.8	5	4.2	3	5.5	3	1	1	2	4.5	5	28.3
	b 1	1907	1	600	1	600	1	600	1					1	0
Morris	*a* 5	1887	7	28.6	6	6.1	7	5.5	6			1	2	7	23.1
Navarro	*a* 8	1894	9	32.8	8	10.9	9	5.6	8			8	40	9	27.2
	b 1	1897	1	182	1	122	1	120	1			1	2	1	62
Newton	*a* 4	1902	4	21	4	2.7	4	2.7	4					4	18.2
	b 1	1902	1	110	1	110	1	110	1					1	0
Nolan	*a* 1	1893	3	30	1	3	3	4.7	1					3	25.3
	b 8	1905	11	130.7	5	38	11	31.1	5			1	10	11	99.6
Nueces	*a* 1	1900	1	27	1	6	1	6	1					1	21
	b 6	1907	6	448.7	6	414.7	6	413.3	6			1	8	6	35.3
Palo Pinto	*a* 3	1895	6	30.5	3	7.7	6	6.2	3					6	24.2
	b 5	1896	8	366.2	7	297.9	7	297.9	6					8	68.1
Panola	*a* 8	1893	9	23.8	7	5.6	9	4.7	7	1	1	1	1	9	19.1
Parker	*a* 3	1891	3	33.7	1	8	3	9	1					3	24.7
	b 3	1905	6	130.2	5	131.8	6	116.5	5					6	13.7
Potter	*b* 3	1906	3	184.3	3	40	3	40	3					3	144.3
Red River	*a* 5	1894	10	34.3	7	5	9	6.5	7	3	6			10	28.1
Reeves	*b* 2	1903	2	122.7	2	25	2	26.5	1					3	96.7

TEXAS—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bistate.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Refugio	a			2	50			2	25	0					2	25
	b			2	1,050	2	1,050	2	1,050	2					2	0
Robertson	a	6	1888	6	49.2	6	7.3	6	7.3	6					6	41.8
Rockwall	a	3	1895	4	31.2	3	16	4	10.2	3			2	22	4	21
	b			2	1,475	1	250	2	1,375	1					2	100
Runnels	b	3	1905	4	75.9	4	19.7	4	19.7	4					4	56.1
Rusk	a	8	1890	8	32.6	4	16.2	8	6.2	4			4	31	8	26.4
Sabine	a	1	1906	7	32.7	3	3	7	3.7	3					7	29
San Augustine	a	9	1896	10	31	9	3.8	7	4.4	6			1	4	10	26.4
San Patricio	b	3	1905	7	171.4	6	150	7	142.9	6					7	28.6
San Saba	a			1	25			1	5	0					1	20
	b	3	1910	4	162.5	1	40	4	37.5	1					4	125
Scurry	a	3	1899	3	36	3	15.7	3	14.2	3			1	4	3	21.7
	b	5	1901	5	101.8	4	34.7	5	59.8	4	1	30			5	42
Shelby	a	3	1896	4	31.7	4	4.1	4	2.4	4			1	7	4	29.4
Sherman	b	5	1904	5	225	5	43	5	43	5					5	182
Smith	a	3	1904	5	37.4			5	6.4	0					5	31
Starr	a			3	51.7	2	20	3	18.3	2					3	33.3
	b			1	100	1	40	1	40	1					1	60
Sutton	b	3	1884	3	183	3	38	3	38	3					3	145
Swisher	a	1	1894	1	30	1	20	1	20	1					1	10
	b	1	1891	4	84.2	1	18	4	25.2	1					4	59
Tarrant	a	3	1880	11	36	11	6.7	11	6.1	11	3	2	5	8.5	11	29.8
	b			3	140	1	80	3	73.3	1					3	66.7
Taylor	a	6	1900	7	29.3	6	5.5	7	4.4	6			1	4.5	7	24.9
	b	1	1902	3	143.3	2	60	3	53.3	2			1	30	3	90
Throckmorton	a	2	1903	3	44.3	3	5.3	3	5	3	1	1	1	2	3	39.3
Titus	a	2	1862	2	11	2	8	2	5	2			2	6	2	6
	b	1	1884	1	80	1	20	1	20	1					1	60
Tom Green	a	1	1890	1	42	1	10	1	11	1	1	1			1	31
	b	2	1906	2	160	2	40	2	40	2					2	120
Travis	a	4	1871	4	20.7	1	20	4	10.4	1			1	12	4	10.4
	b	2	1890	6	363.7	6	258.3	6	247.5	6			1	65	6	116.2
Trinity	a	1	1908	5	21.2	3	5.7	5	5.2	3					5	16
Tyler	a	3	1903	3	28	3	6	3	2.8	3			2	9.5	3	25.2
Upshur	a	5	1871	8	31.9	8	6.1	8	4.2	8			2	15	8	27.6
Upton	a			1	25			1	5	0					1	20
	b			1	400			1	150	0					1	250
Uvalde	b	4	1907	4	381.5	3	16.7	4	18.7	3			1	5	4	362.7
Van Zandt	a	6	1888	6	28.2	6	7	6	6.6	6	2	3.5	2	6	6	21.6
Victoria	b	3	1908	3	81	3	18.3	3	18.3	3					3	62.7
Walker	a	2	1908	2	26	2	2.2	2	2.2	2					2	23.7
	b			1	100			1	25	0					1	75
Waller	a	3	1901	3	41	3	16.3	3	16.3	3					3	24.7
Ward	b	1	1907	3	90	1	60	3	40	1			1	20	3	50
Washington	a	2	1864	2	45.5	2	5.5	2	3	2			2	5	2	42.5
	b	1	1894	2	142.5	2	105	2	103	2			1	4	2	39.5
Wharton	a			4	36.2	1	4	4	10.5	1			1	2	4	25.7
	b			1	90	1	50	1	50	1					1	40
Wheeler	a	1	1906	1	14	1	5	1	5	1					1	9
	b	8	1906	8	160.2	8	19.5	8	22	8	2	20			8	138.2
Wichita	a	8	1901	10	27.5	10	8.3	10	8.6	8	3	15	3	12	10	18.9
	b	2	1907	2	82.5	2	50	2	45	2			1	10	2	37.5
Willbarger	a	9	1894	10	30.7	9	4.9	8	8.7	7	5	19.5	1	7	10	22.5
Williamson	a	1	1906	3	47.3	2	6	3	3	2			2	5	3	44.3
	b	3	1900	3	1,307	3	1,270.7	3	1,267.3	3			1	10	3	39.7
Wilson	b	2	1884	2	125	2	33	2	33	2					2	92
Wise	a	8	1882	12	55.7	10	7.9	12	9.8	10	2	13			12	45.8
	b	5	1897	10	110.7	10	40.8	10	40.8	10					10	69.9
Wood	a			2	30	2	6	2	10	2	2	8			2	20
	b			1	100	1	15			0					1	85
Zapata	a			3	40			3	31.7	0					3	8.3
Zavalla	a	3	1899	3	47.7	3	3.7	3	3.3	3			1	1	3	44.3
Total	a	572	1890.7	848	34.7	593	7.8	826	6.8	570	48	185.5	207	873.0	848	27.8
	b	344	1901.6	538	233.8	379	151.4	497	148.9	353	18	188.0	53	1588.0	523	87.0
Aggregate		916	1894.8	1386		972		1323		923	66	373.5	260	2431.0	1371	50.4

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Anderson	3		2	4	1		7	Bastrop	5		3	7	2	2	14
Angelina	1	1	2				3	Bee	2			4	3	1	8
Archer	1		1	1	2		4	Bell	3	4	3	1	1		9
Atascosa	2	3	1	3	1		8	Bexar	9	2	2	10	7	14	35
Austin	8		2	12	6		20	Blanco	3	1	1	2	2	3	9

TEXAS—Continued.

PROPORTIONATE DEPTHS—Continued.

County.	Cor.	A.	B.	C.	D.	E.	Total.
Bosque	4	4	9	2	4	1	20
Bowie	5	....	9	5	1	....	15
Brazoria	10	8	20	2	1	....	31
Brazos	2	1	2	2	3	....	8
Brown	5	....	2	3	5	1	11
Burleson	1	....	2	....	....	....	2
Burnet	5	3	4	4	2	2	15
Caldwell	4	1	7	3	....	....	11
Callahan	2	....	4	1	....	....	5
Cameron	4	3	4	....	....	....	7
Camp	1	....	2	....	....	....	2
Cass	4	....	6	4	....	....	10
Castro	1	....	....	....	1	2	3
Cherokee	6	....	9	6	1	....	16
Childress	2	....	....	2	3	....	5
Clay	4	1	5	2	3	....	11
Coke	2	....	1	....	3	1	5
Coleman	2	....	....	1	2	1	4
Collin	6	3	6	2	....	5	16
Collingsworth	3	....	....	2	2	3	7
Colorado	3	1	2	2	1	....	6
Comal	4	....	2	2	2	6	12
Comanche	5	....	3	3	6	3	15
Concho	3	....	4	3	1	....	8
Cooke	2	....	2	1	4	1	8
Coryell	8	5	5	5	8	3	26
Crosby	1	....	....	....	3	....	3
Dallam	1	....	....	....	....	2	2
Dallas	7	6	9	4	1	1	21
Dawson	1	....	....	1	2	....	3
Delta	3	....	4	2	....	1	7
Denton	6	....	6	7	5	2	20
De Witt	4	....	1	8	3	....	12
Dickens	1	....	1	....	1	....	2
Duval	2	1	....	2	1	....	4
Eastland	6	....	6	8	4	1	19
Edwards	1	....	....	....	....	4	4
Ellis	5	4	8	1	....	....	13
El Paso	2	....	3	....	....	2	5
Erath	3	....	3	2	2	1	8
Falls	2	3	3	....	1	....	7
Fannin	5	....	8	2	....	....	10
Fayette	9	1	8	13	11	2	35
Fisher	1	....	2	....	1	....	3
Floyd	3	....	1	3	1	3	8
Foard	2	....	1	4	....	2	7
Fort Bend	4	3	1	3	....	....	7
Franklin	1	....	2	....	1	....	3
Freestone	1	....	3	....	....	....	3
Frio	1	....	....	2	1	....	3
Galveston	5	12	3	....	....	....	15
Gillespie	4	....	6	3	3	1	13
Glasscock	1	1	1	....	1	1	4
Gonzales	4	1	2	4	4	1	12
Gregg	2	1	1	3	1	....	6
Grimes	2	1	6	9	1	....	17
Guadalupe	2	....	....	3	....	....	3
Hale	1	....	....	5	....	....	5
Hall	1	1	1	1	....	....	3
Hamilton	2	....	....	3	....	3	6
Hardeman	1	....	....	3	....	....	3
Hardin	1	....	....	3	....	....	3
Harris	4	....	10	1	1	....	12
Harrison	7	....	12	5	....	....	17
Hartley	1	....	....	....	....	2	2
Haskell	1	....	....	3	....	....	3
Hays	1	....	1	....	....	2	3
Hemphill	1	....	....	1	1	1	3
Henderson	1	....	2	1	....	....	3
Hidalgo	2	....	3	....	....	....	3
Hill	3	....	8	....	....	....	8
Hood	3	....	....	4	1	1	6
Hopkins	3	2	1	2	3	....	8
Houston	1	....	1	1	1	....	3
Howard	1	....	2	1	....	..	3
Hunt	3	....	3	5	1	1	10
Jack	3	1	6	2	....	....	9
Jackson	2	1	2	4	1	....	8
Johnson	5	....	6	4	1	....	11
Jones	5	2	6	2	1	....	11
Karnes	2	....	....	3	2	1	6
Kaufman	5	....	10	3	....	....	13
Kendall	7	4	3	4	2	11	24
Kent	1	....	1	....	1	....	2
Kerr	1	....	2	....	....	1	3
Knox	7	....	11	6	1	....	18
Lamar	2	2	2	3	....	....	7
Lamb	1	....	....	....	3	....	3
Lampasas	2	1	....	2	....	1	4
Lavaca	3	1	4	3	2	....	10
Lee	3	....	....	5	2	....	7
Leon	2	....	3	2	1	....	6
Liberty	2	....	5	2	....	....	7
Limestone	3	....	4	2	2	....	8
Lipscomb	1	1	....	1	1	....	3
Llano	1	1	1	....	1	....	3
Madison	1	....	....	....	1	....	1
Marion	1	....	3	....	....	....	3
Mason	3	....	4	1	2	....	7
Matagorda	3	6	2	2	2	....	12
McCulloch	3	....	1	5	1	....	7
McLennan	7	6	12	....	1	....	19
Menard	2	2	1	....	2	1	6
Milan	4	1	5	3	1	....	10
Mills	3	1	1	2	4	2	10
Mitchell	1	....	....	....	2	1	3
Montague	1	....	1	....	....	....	1
Montgomery	2	1	3	2	....	....	6
Morris	3	....	6	1	....	....	7
Navarro	4	....	6	3	1	....	10
Newton	2	1	4	....	....	....	5
Nolan	4	....	5	....	3	6	14
Nueces	3	4	1	1	....	1	7
Palo Pinto	3	1	6	3	2	2	14
Panola	3	1	8	....	....	....	9
Parker	3	4	3	2	....	....	9
Potter	1	....	....	....	....	3	3
Red River	4	....	5	4	1	....	10
Reeves	1	....	....	....	2	1	3
Refugio	1	2	2	....	....	....	4
Robertson	2	....	2	3	1	....	6
Rockwall	4	1	3	1	....	1	6
Runnels	2	....	1	....	3	....	4
Rusk	2	1	4	3	....	....	8
Sabine	2	....	5	1	1	....	7
San Augustine	3	....	5	5	....	....	10
San Patricio	3	....	4	3	....	....	7
San Saba	2	....	1	....	1	3	5
Scurry	3	....	5	2	1	....	8
Shelby	2	....	2	2	....	....	4
Sherman	2	....	....	....	....	5	5
Smith	2	....	2	3	....	....	5
Starr	1	....	1	3	....	....	4
Sutton	1	....	....	....	....	3	3
Swisher	3	....	1	2	2	....	5
Tarrant	4	....	6	7	1	....	14
Taylor	4	1	5	1	2	1	10
Throckmorton	1	....	....	3	....	....	3
Titus	1	2	....	1	....	....	3
Tom Green	1	....	....	2	....	1	3
Travis	3	4	2	....	2	2	10
Trinity	2	....	5	....	....	....	5
Tyler	1	....	3	....	....	....	3
Upshur	4	....	5	3	....	....	8
Upton	1	....	1	....	....	1	2
Uvalde	1	....	....	....	....	4	4
Van Zandt	2	....	6	....	....	....	6
Victoria	1	....	....	1	2	....	3
Walker	1	....	2	....	1	....	3
Waller	1	....	2	1	....	....	3
Ward	1	....	....	3	....	....	3
Washington	1	1	1	....	2	....	4
Wharton	2	....	3	2	....	....	5
Wheeler	3	1	....	1	2	5	9
Wichita	4	....	11	1	....	....	12
Wilbarger	4	4	4	1	1	....	10
Williamson	3	2	2	....	1	1	6
Wilson	1	....	....	....	2	....	2
Wise	7	1	2	14	3	2	22
Wood	1	....	2	....	1	....	3
Zapata	1	1	2	....	....	....	3
Zavalla	1	....	....	3	....	....	3
172 counties	477	141	505	373	209	143	1,371
Per cent	....	10.3	36.8	27.2	15.3	10.4	.....

Reporters' remarks:

Anderson County: "Two droughty years, and crops and range are short; water in wells and springs plentiful—none fail." Angelina County: "One spring failed, the first time in 10 years." Austin County: "Several springs failed; cause, severe drought." "A drought for two years." "Driest year since 1864; a good many wells and springs have failed entirely." Bastrop County: "Nearly all springs stopped and some wells dry, due to lack of rain for the last 2 years." Bee County: "Water is plentiful." Bell County: "Plenty of water in wells; the river is going dry; very bad drought." "Springs are failing badly; a well 90 feet deep has plenty of water when the wind is in the north, but runs almost dry with a high wind from the south." "It is easier to find wells now than it used to be." Blanco County: "Wells holding out fine for the dry weather." Bosque County: "Several surface wells and springs have failed." "The supply of water (in 100–130-foot wells) rarely fails." Brazoria County: "No change in water level." "Well water supply is inexhaustible." Brown County: "Wells are strong; dry weather has no effect on them." "Wells do not change." Burnet County: "Many springs and wells have failed in the past 27 years." Caldwell County: "Some wells have failed since July." Cass County: "Two wells have failed." Cherokee County: "No material change in water supply in 8 years." "Some wells failing through long drought; some have to be dug deeper." "Water is getting scarce." Clay County: "Country underlain with sheet water." Coke County: "Water can be found anywhere; no wells failed or changed in water level." Colorado County: "Wells used for rice irrigation; during irrigation season water falls 15 to 20 feet, but always returns after pumping season closes." Comanche County: "Inexhaustible supply." Concho County: "The present drought (the worst in 20 years) has affected very few wells." Coryell County: "This is sheet water." "No change in the water in the last 20 years." Crosby County: "Water found about same depth and abundance; ground perfectly dry to the water bed." Dallam County: "Underlain with sheet water at depth according to lay of the land; fed from the snows of the mountains; neither drought nor wet weather has any effect on the wells." Dallas County: "Springs have not failed in 40 years." Dawson County: "Have known this country 19 years; always plenty of water; could be got to irrigate with." De Witt County: "No perceptible sinking of water level; beyond influence of long drought." Dickens County: "Dry weather has caused abandonment of some wells; springs failing; water scarcer than for 25 years." Ellis County: "Two springs have never failed for 40 years." Fannin County: "No scarcity of water; can dig anywhere and get plenty." "Wells plentiful; water seems to be everlasting." Fayette County: "Some wells dry on account of drought; water never was scarce before; many springs have failed." Fisher County: "Some dug wells have gone dry during drought which has not been broken this year." Floyd County: "Water supply is not affected by wet or dry weather, depth is governed by elevation, and can be got any place." Foard County: "Drier than for 18 years; some springs dry." Freestone County: "Everything dried up; no rains to place water in the earth for 2 years; all springs that have not gone dry are drying up; creeks that never quit before have stopped running; driest time we ever had." Frio County: "Dry weather does not affect the wells." Gonzales County: "Drought has caused many wells to sink in water, and some artesian wells have ceased to flow." Gregg County: "Shallow wells are going dry." Hale County: "Wells can not be pumped dry; it is called sheet water." Hall County: "Depth of wells depends on elevation; there is a strong underflow of water." Hamilton County: "The water in wells is termed sheet water and is practically inexhaustible." Hardeman County: "No change in wells; in extreme dry weather wells flow as usual." Hardin County: "Wells very near dry." Harrison County: "Nearly all wells weak; worst drought for years." "Wells nearly all dry from long dry spell." Hartley County: "Sheet water from Rocky Mountains; not affected by local rains or

droughts." Hill County: "A spring 30 years ago ran a considerable stream; now it lacks over a foot of rising to the surface." Hood County: "No change in water in the last 25 years." "Water in horizontal sand beds at depths depending on undulations of the surface." Hopkins County: "What is known as sheet water; an inexhaustible supply." Howard County: "Most wells are very low on account of dry weather; others are much stronger than when dug." Johnson County: "These wells are not affected by rainfall at all; others vary according to rainfall." "Water in 3 drilled wells has gone down 100 feet (not recorded in schedules and hence not tabulated) during two years of drought." Jones County: "No failure in wells, though very little rain in 18 months." "Shallow wells have gradually failed, but deep wells have held out." Kaufman County: "No change in water supply in 25 years." Kendall County: "Driest season since 1879; most if not all springs failed." "Water on the same level, reached by drilling deeper where the land is higher; abounding water; where more wells are drilled the water does not rise so high." "All the shallow wells are dry." Knox County: "Wells are inexhaustible." "Some wells have failed entirely." Lamb County: "Wells about the same depth; a great supply of water at that depth." Lampasas County: "Twenty-eight years ago there were fine springs, but all have been dry for 10 years." Lavaca County: "Several dug wells have gone dry." Lee County: "In 40 years water level has risen." Leon County: "Two-thirds of the shallow wells have failed on account of the drought; some springs have failed." Limestone County: "Water lower than usual on account of long-continued drought." McLennan County: "Driest weather in 20 years; one-third of the wells have failed; one-half have low water." Menard County: "Two wells and one spring went dry this year." Milam County: "A kind of sheet water." "Stock water scarcer than for 45 years; many springs have failed entirely; many have got weak." Morris County: "Some branches dried up, but no failure in wells." Navarro County: "Drought for 2 years has caused wells to be lower than ever before; tanques all dry." "Two years' drought has affected the wells; some have failed entirely." Nolan County: "Sheet water here." "Wells not affected by dry or wet weather." Nueces County: "As a rule the flow of water from artesian wells gradually decreases." Panola County: "Have known two bold springs to go dry." Parker County: "There was a spring here in 1900; it went dry this year." Potter County: "Sheet water; abundant supply; no change except by city water company when their wells were less than 50 feet apart." Rusk County: "Water level rising; supposed to be caused by clearing and cultivation of land." Scurry County: "Water supply is inexhaustible and does not vary with changing seasons." Shelby County: "Owing to dry weather wells are getting low." Swisher County: "Wells of Plains country are of uniform depth; same strata all over." Throckmorton County: "A long drought has caused the wells to be low, but they never go dry." Trinity County: "Two springs have failed." Upshur County: "River very low; every pond and stream is drying up; wells failing." "Longest dry spell since 1860, but no difference in wells." Van Zandt County: "Most wells increase in water instead of decreasing." Washington County: "Springs in wells and branches are very weak from the long drought." Wharton County: "Water not affected by climatic conditions." Wheeler County: "Windmills do not lower the water, even when they run day and night." "Water is found at the sheet water level; variation of land accounts for variation in depth of wells." Wichita County: "Water is getting more plentiful under the ground, but less on top." Willbarger County: "Water is rising; where it once seemed impossible to get water it is now found by digging." Williamson County: "Two dry years in succession affecting the water supply; many wells now dry." Wise County: "Wells are increasing in water regardless of the extended drought." "Some wells have gone dry." "Drilled wells inexhaustible; dry weather does not affect the supply."

Incongruities in the foregoing remarks are due in part to local conditions at and about the particular stations reported; but they are due more largely to the general variability in physiography and structure of the vast area comprised within the State. Especially in northern-central and eastern Texas the wells were undoubtedly affected by the remarkable drought, extending also into Oklahoma; in the southeastern section rice irrigation and other industries have tended to lower the water level abnormally; in the southern-central part of the State where artesian boring has long been in vogue, wells formerly flowing are now pumped, attesting a decided lowering in head (in Bexar County alone the mean water level in 7 wells has lowered 702 feet, or an average of over 100 feet); while throughout most of the northwestern counties the extended underflow from the Rocky Mountains (known generally throughout the Plains as sheet water) has thus far sufficed to meet the needs of users. The schedule records corroborate the remarks of several reporters (and correct inferences which might be drawn hastily from other remarks) by showing that on the average the lowering of water in drilled wells is over seven times greater than that in dug wells. It is largely by reason of this excessive drawing down of the head in drilled wells that Texas stands so near the top of the list (in the third place) of States arranged in the order of lowering in their water level.

UTAH.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Beaver	*a* 3	1890	3	40.7	3	4	3	17	3	3	39	....	.....	3	23.7
Boxelder	*a* 7	1899	7	17.2	1	20	7	9.9	1	....	.....	1	8	7	7.4
Davis	*a* 3	1878	4	33.5	3	7	4	14.7	3	3	34	....	.....	4	18.7
	b 2	1908	5	312	4	320	5	262	4	....	.....	....	.....	5	50
Iron	*b* 1	1898	2	200	2	197.5	2	200	2	1	5	....	.....	2	0
Juab	*a* 2	1897	3	31	2	32.5	3	24	2	....	.....	....	.....	3	7
	b 1	1890	1	335	1	335	1	335	1	....	.....	....	.....	1	0
Millard	*a* 1	1910	1	23	....	.....	1	17	0	....	.....	....	.....	1	6
	b 2	1895	4	153.7	2	152.5	4	142.5	2	....	.....	....	.....	4	11.2
Morgan	*a* 4	1892	4	36.5	3	4.5	4	5.1	3	1	4.5	1	5.5	4	31.4
Salt Lake	*a* 2	1896	2	29	2	9	2	5.5	2	....	.....	2	7	2	23.5
	b 1	1907	1	410	1	200	1	200	1	....	.....	....	.....	1	210
San Juan	*a* 3	1908	3	12.3	3	4.8	3	1.2	3	....	.....	3	11	3	11.2
	b 2	1909	2	1,000	2	1,000	2	1,000	2	....	.....	....	.....	2	0
Sanpete	*a* 10	1891	12	39.7	8	7.7	12	17.6	8	3	48	3	24	12	22.1
Sevier	*a* 7	1898	8	35.7	7	4.6	8	7	7	3	18.5	3	6	8	28.7
Tooele	*b*		2	165	2	165	2	165	2	....	.....	....	.....	2	0
Utah	*a* 2	1895	3	66.7	2	20	2	19	1	....	.....	....	.....	3	50.7
	b	.....	2	600	2	600	2	600	2	....	.....	....	.....	2	0
Wasatch	*a* 1	1908	4	17.5	4	7	4	8.7	4	4	7	....	.....	4	8.7
Washington	*a* 1	1875	3	40	1	10	3	9.7	1	....	.....	....	.....	3	30.3
Wayne	*a* 3	1905	3	60	3	8	3	12.3	3	3	13	....	.....	3	47.7
Total	*a* 49	1895.4	60	34.4	42	8.6	59	12.0	41	20	164.0	13	61.5	60	22.4
	b 9	1902.1	19	360.5	16	377.8	19	333.9	16	1	5.0	0	0.0	19	26.6
Aggregate	58	1896.5	79	.....	58	.....	78	.....	57	21	169.0	13	61.5	79	23.4

UTAH—Continued.

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Beaver	1	.....	2	1	....	....	3	Sevier	3	2	2	4	....	....	8
Boxelder	3	5	2	.....	....	....	7	Tooele	1	2	.....	.....	....	....	2
Davis	3	5	2	1	....	1	9	Utah	1	2	.....	2	1	....	5
Iron	1	2	.....	.....	....	....	2	Wasatch	1	3	1	.....	....	....	4
Juab	1	3	1	.....	....	....	4	Washington	2	.....	2	1	....	....	3
Millard	3	3	2	.....	....	....	5	Wayne	1	.....	.....	3	....	....	3
Morgan	2	1	2	.....	1	....	4								
Salt Lake	1	.....	2	.....	....	1	3	16 counties	30	34	27	13	3	2	79
San Juan	2	2	3	.....	....	....	5	Per cent	....	43.0	34.2	16.5	3.8	2.5	....
Sanpete	4	4	6	1	1	....	12								

Reporters' remarks:

Beaver County: "Water has risen in wells; caused by increased irrigation." Boxelder County: "Before irrigation water salty and unfit for use." "Lowering due to dry land lucerne taking up the water." Davis County: "Increase in water in wells caused by irrigation; quite a number of small springs have started to flow during the past 35 years." Sevier County: "Water varies with irrigation." Wayne County: "Increase in water due to irrigation."

As usual in the Cordilleran States, nearly all wells reported are in irrigable valleys, and both the records and the remarks emphasize changes due to irrigation rather than any change in subsoil water level for the State as a whole.

VERMONT.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Addison	*a* 3	1857	8	23.2	8	15.5	8	8.1	8	....	.....	7	59	8	15.1
	b 2	1896	2	79	2	67.5	2	67.5	2	....	.....	....	.....	2	11.5
Bennington	*a*	.....	3	19.7	....	.....	3	4	0	....	.....	....	.....	3	15.7
Caledonia	*a*	.....	4	10	....	.....	4	3.2	0	....	.....	....	.....	4	6.7
Franklin	*a* 1	1875	2	20.5	....	.....	2	4.5	0	....	.....	....	.....	2	16
Orange	*a* 3	1885	6	13.2	6	2.5	3	2.3	3	....	.....	3	3	6	11.2
Orleans	*a* 2	1872	3	22.7	2	4.5	3	2.7	2	....	.....	1	6	3	20
Rutland	*a* 5	1821	10	17.8	5	7	9	4.4	4	....	.....	1	2	10	12.8
Washington	*a* 3	1814	3	23.3	1	2	3	3.7	1	....	.....	....	.....	3	19.7
Windsor	*a* 1	1820	8	12.1	4	4.1	8	3.4	4	....	.....	3	6	8	8.7
Total	*a* 18	1845.1	47	17.4	26	7.8	43	4.5	22	0	0.0	15	76.0	47	13.0
	b 2	1896.5	2	79.0	2	67.5	2	67.5	2	0	0.0	0	0.0	2	11.5
Aggregate	20	1850.2	49	.....	28	.....	45	.....	24	0	0.0	15	76.0	49	12.9

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	Total.	County.	Cor.	A.	B.	C.	Total.
Addison	4	2	8	.....	10	Rutland	6	2	8	.....	10
Bennington	1	1	2	.....	3	Washington	2	.....	2	1	3
Caledonia	2	3	1	.....	4	Windsor	3	5	3	.....	8
Franklin	1	.....	2	.....	2						
Orange	2	2	4	.....	6	9 counties	23	15	32	2	49
Orleans	2	.....	2	1	3	Per cent	.....	30.6	65.3	4.1	.....

Reporters' remarks:

Addison County: "Hardly a well in which the water has not lowered 5 to 20 feet within 15 years." "Plenty of water if drilled for; the lack of water in pastures is very bad." Washington County: "Springs without much change in the last 30 years; some of the streams are not quite so large, owing to the land being cleared of trees."

The remarks merely illustrate the records, which indicate that while the wells of Vermont are generally shallow, the rate of lowering of water level is second only to that of New Hampshire in the New England States.

VIRGINIA.

PIEDMONT.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean
Albemarle	*a* 17	1866	18	54.6	12	10.6	18	8.9	12			5	25	18	45.7
Alexandria	*a* 3	1877	4	45.5	3	15	4	11.7	3			1	5	4	33.7
	b 1	1909	1	150	1	50	1	10	1			1	40	1	140
Alleghany	*a* 1	1885	1	35	1	8	1	4	1			1	4	1	31
Amelia	*a* 11	1878	14	36.3	14	6.3	10	4.9	10			5	11.5	14	30.8
Amherst	*a* 4	1886	12	49	3	4.5	12	6.4	3			3	10	12	42.6
Appomattox	*a* 8	1864	12	62.5	2	8	12	6.2	2			2	5	12	56.2
Augusta	*a* 13	1866	15	34.9	11	11.7	15	7.9	11			8	35	15	27.1
	b 2	1903	3	94	2	65	3	46.7	2			2	30	3	47.3
Bath	*a* 7	1878	10	25.3	10	8.7	10	6.2	10			4	25	10	19.1
Bedford	*a* 26	1890	33	57.4	28	8.6	33	8.3	28	1	2	7	25	33	49.1
Bland	*a* 3	1898	3	44.3	3	12	3	12	3					3	32.3
Botetourt	*a*		5	46.4			5	7.6	0					5	38.8
	b 7	1900	9	106.8	5	38.2	9	36.9	5			3	40	9	69.9
Brunswick	*a* 19	1879	19	30.3	18	8.1	18	7.2	17	1	1	9	21	19	23.2
Buchanan	*a* 5	1894	6	25.2	6	6.8	6	6.5	6	3	4	3	6	6	18.7
Buckingham	*a* 11	1878	11	42.3	9	7.7	11	5.9	9			7	13.5	11	36.5
Campbell	*a* 7	1872	11	41.1	9	10.8	9	9	7			2	10	11	31.9
	b 1	1903	1	80	1	40			0					1	40
Carroll	*a* 10	1886	11	36.5	11	6.4	11	5.5	11			7	10	11	31.1
	b 1	1909	1	100	1	6	1	6	1					1	94
Charlotte	*a* 3	1875	6	41.8	5	7.2	6	6.5	5			1	2	6	35.3
Chesterfield	*a* 14	1881	16	25.6	12	6.8	16	5.7	12	2	1.5	7	8	16	19.8
Clark	*a* 6	1848	7	42.1	6	6.2	7	6.7	6					7	35.4
Craig	*a*		4	30.5			4	5.5	0					4	25
Culpeper	*a* 9	1881	9	29.6	7	6.3	9	5.5	7			2	2.5	9	24.1
Cumberland	*a* 6	1885	13	40	6	12.3	13	9.9	6					13	30.1
Dickenson	*a* 1	1879	1	24	1	10	1	10	1					1	14
	b 1	1905	1	72	1	11	1	11	1					1	61
Dinwiddie	*a* 8	1886	12	30.2	12	7.8	12	7.7	12	3	6	4	7	12	22.4
Fairfax	*a* 10	1877	10	30.4	10	6.2	9	5.1	9			5	14.5	10	25.6
	b 1	1885	1	75	1	65	1	65	1					1	10
Fauquier	*a* 4	1860	6	42.5	4	5.1	6	4	4			3	9.5	6	38.5
	b 5	1897	9	104	4	109	9	76.2	4					9	27.8
Floyd	*a* 3	1901	6	36.5	3	5.8	6	6.3	3			1	0.5	6	30.2
	b		3	93.3			3	33.3	0					3	60
Fluvanna	*a* 6	1887	8	51.4	6	8	8	6.9	6			2	4	8	44.5
Franklin	*a* 3	1898	3	53.3	3	6.5	3	5	3			3	4.5	3	48.3
Frederick	*a* 6	1847	7	30.4	6	16.2	7	12.6	6			4	14	7	17.9
	b 1	1880	2	109	1	133	2	71.5	1					2	37.5
Giles	*a* 3	1898	3	35	3	7.7	2	4	2			2	6	3	29.3
Goochland	*a* 8	1892	9	44.2	5	9.4	9	9.1	5			2	7	9	35.1
Grayson	*a* 9	1890	9	44.6	9	10.4	8	8.1	8			4	4	9	33.4
Greene	*a* 3	1894	3	20	3	8	3	2	3			3	18	3	18
Halifax	*a* 20	1889	25	49.1	21	10.2	23	8.2	19			11	44.5	25	41.1
Hanover	*a* 9	1878	12	35.3	12	7.4	12	7	12			3	5	12	28.3
Henry	*a* 12	1900	14	54	14	5.5	12	5.2	12			3	6	14	49
	b 1	1910	1	90	1	40	1	35	1			1	5	1	55
Highland	*a* 6	1879	8	30.5	6	8.7	8	6.5	6			5	8.5	8	24
Lee	*a* 3	1907	3	34.7	3	11.3	3	10.3	3	1	1	1	4	3	24.3
	b		2	95			2	12.5	0					2	82.5
Loudoun	*a* 3	1876	4	28.2	3	13.7	4	7.2	3			2	15	4	21
	b 2	1889	3	76.7	2	40	3	38.3	2			2	10	3	38.3
Louisa	*a* 12	1871	20	36.7	11	7.7	20	7	11	1	3	5	5.5	20	29.8
Lunenburg	*a* 13	1885	15	29.9	12	7.6	15	6.4	12			4	15	15	23.5
Madison	*a* 3	1898	5	35.2	3	11.3	3	7	1					5	26
Mecklenburg	*a* 10	1893	11	45.1	11	7.5	11	7	11	3	5	4	11.5	11	38.1
Montgomery	*a* 7	1866	7	38.7	5	12	7	11.9	5			1	5	7	26.9
	b 5	1908	5	71.2	1	12	5	23.2	1					5	48
Nelson	*a* 3	1902	3	52.7	3	12.7	3	7.7	3			3	15	3	45
Nottoway	*a* 12	1871	13	41	13	4.9	13	3.9	13			7	13	13	37.1
Orange	*a* 6	1877	6	40.5	6	10.8	3	11	3					6	29.7
Page	*a* 5	1866	6	39.8	5	12.6	6	7.2	5			2	22	6	32.7
	b		1	100	1	5	1	2	1			1	3	1	98
Patrick	*a* 2	1873	6	54.2	4	7.2	4	8	2					6	47.3
Pittsylvania	*a* 14	1886	21	44.8	17	6.2	21	5.4	17			8	19.5	21	39.3
Powhatan	*a* 7	1865	9	26.2	6	7.6	9	5.6	6			2	10	9	20.6
Prince Edward	*a* 7	1887	9	47.8	7	6.1	9	6.4	7			1	3	9	41.3

VIRGINIA—Continued.

PIEDMONT—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Prince William	a	7	1875	12	37.7	10	12.1	11	8.5	9	....	.....	4	19	12	27.3
	b	6	1899	7	107.1	6	57.5	1	70	0	....	.....	....	.....	7	47.9
Pulaski	a	5	1857	5	51	5	12.5	3	11.3	3	....	.....	2	7.5	5	40
	b	1	1904	1	85	1	28	1	30	1	1	2	....	.....	1	55
Rappahannock	a	3	1858	3	30	3	6.3	3	4	3	....	.....	3	7	3	26
	b	1	1905	1	70	1	20	1	20	1	....	.....	....	.....	1	50
Roanoke	a	1	1855	4	37.5	4	15	4	14	4	2	4	2	8	4	23.5
	b	2	1895	2	94	2	30	2	30	2	....	.....	....	.....	2	64
Rockbridge	a	3	1904	3	40	3	14.3	3	7	3	....	.....	3	22	3	33
Rockingham	a	21	1858	21	36.2	21	10.4	19	9.2	19	....	.....	8	25	21	27.1
	b	4	1899	4	152.5	3	116.7	3	106.7	2	....	.....	....	.....	4	60
Russell	a	1	1879	7	29.7	4	6.7	7	9.1	4	....	.....	3	5	7	20.6
	b	5	1907	6	85.2	5	34	6	34.2	5	....	.....	....	.....	6	51
Scott	a		.....	6	45	..	.....	6	6.7	0	....	.....	....	.....	6	38.3
Shenandoah	a	3	1872	5	23	5	9.2	4	8	4	....	.....	3	11	5	16
	b	1	1909	1	165	1	65	1	65	1	....	.....	....	.....	1	100
Smyth	b	9	1907	9	73.8	9	20	6	15.4	6	....	.....	3	12.5	9	55.2
Spotsylvania	a	9	1878	13	34.2	9	5.6	13	4.7	9	....	.....	5	5	13	29.6
Stafford	a	12	1892	12	29.1	12	6.5	12	6.2	12	3	6	6	9.5	12	22.8
Tazewell	a	4	1898	4	28	4	10.7	4	10.5	4	....	.....	1	1	4	17.5
	b	3	1907	3	130	3	28.3	3	28.3	3	....	.....	....	.....	3	101.7
Warren	a	7	1883	7	49	7	16.9	7	11.3	7	....	.....	4	39	7	37.7
	b	2	1895	2	125.5	2	70	2	55	2	....	.....	2	30	2	70.5
Washington	a	1	1900	2	16	2	4	2	2	2	....	.....	2	4	2	14
	b	5	1909	5	77.8	2	42.5	5	41.8	2	....	.....	....	.....	5	36
Wise	a	1	1905	1	40	1	10	....	.....	0	....	.....	....	.....	1	30
	b	1	1906	1	150	1	28	1	26	1	....	.....	1	2	1	124
Wythe	a	3	1883	3	26.7	3	17.3	3	14.7	3	....	.....	2	8	3	12
Total	a	482	1879.7	622	39.9	496	8.7	594	7.3	468	20	33.5	217	681.0	622	32.5
	b	68	1902.6	85	98.2	58	47.5	74	41.5	47	1	2.0	16	172.5	85	55.9

TIDEWATER.

Accomac	a	5	1896	12	20.6	5	6.6	12	7.6	5	....	.....	1	2	12	13
	b	3	1902	3	120.7	3	117.7	3	117.7	3	....	.....	....	.....	3	3
Charles City	a	5	1900	5	23.8	4	10.4	5	6.7	4	....	.....	2	13.5	5	17.1
	b		.....	1	240	1	240	1	240	1	....	.....	....	.....	1	0
Caroline	a	12	1885	15	37.7	11	7	11	6.6	7	....	.....	5	15	15	31.6
	b		.....	3	190	3	152	3	152	3	....	.....	....	.....	3	38
Elizabeth City	a		.....	2	11.5	....	.....	2	3	0	....	.....	....	.....	2	8.5
Essex	a	1	1895	3	29.7	3	6.3	3	6	3	....	.....	1	1	3	23.7
Gloucester	a	6	1883	9	26.3	9	5.8	9	7.6	9	4	18	1	2	9	18.7
	b	1	1900	1	300	1	300	1	300	1	....	.....	....	.....	1	0
Greenesville	a	1	1828	3	36.7	1	20	3	13.3	1	....	.....	1	5	3	23.3
Henrico	a	2	1897	2	35	....	.....	2	22	0	....	.....	....	.....	2	13
	b	1	1906	1	300	....	.....	1	278	0	....	.....	....	.....	1	22
Isle of Wight	a	9	1872	9	19.3	6	4.6	9	6.6	6	....	.....	....	.....	9	12.7
James City	a	3	1892	3	22	3	4	3	3.8	3	....	.....	1	0.5	3	18.2
King and Queen	a	2	1882	3	25	2	3	3	3	2	....	.....	....	.....	3	22
King George	a	1	1910	2	22	2	4	2	4	2	....	.....	....	.....	2	18
	b	1	1900	1	280	1	280	1	280	1	....	.....	....	.....	1	0
King William	a	8	1866	13	33.5	6	6.7	13	7.9	6	....	.....	....	.....	13	25.6
	b		.....	1	200	1	200	1	200	1	....	.....	....	.....	1	0
Mathews	a	8	1856	11	20.1	9	3.9	11	9.4	9	2	2	1	4	11	10.7
	b	1	1909	1	140	1	135	1	135	1	....	.....	....	.....	1	5
Middlesex	a	6	1891	6	24.2	6	3.8	6	3.7	6	....	.....	1	1	6	20.5
Nansemond	a	5	1835	5	18.4	3	7.3	5	6.6	3	....	.....	2	3	5	11.8
New Kent	a	7	1898	7	36.7	6	7.5	5	6.6	4	....	.....	2	5	7	29.9
Norfolk	a	6	1877	8	21.1	7	3.9	8	8.7	7	....	.....	1	2	8	12.4
Northampton	a	3	1840	5	20.2	3	3.3	5	3.2	3	....	.....	3	1.5	5	17.1
Northumberland	a	7	1863	8	28.4	8	8.5	6	5.8	6	....	.....	1	4	8	20.4
Prince George	a	11	1894	13	26.3	11	7.7	10	7.4	8	....	.....	5	5	13	19
Princess Anne	a	10	1866	13	13.5	8	4.9	13	4.7	8	4	4	4	7	13	8.8
Richmond	a	3	1854	3	49	3	5	3	4.3	3	....	.....	2	2	3	44.7
Southampton	a	3	1870	5	21	3	8	5	6.4	3	....	.....	....	.....	5	14.6
Surry	a	4	1864	4	32.6	2	3.7	4	4.1	2	....	.....	1	3	4	28.5
Warwick	a	6	1880	6	18	4	6.1	6	6.2	4	....	.....	3	3	6	11.8
Westmoreland	a	11	1874	16	33.5	14	6	16	5.1	14	1	2	11	14.5	16	28.4
York	a	3	1870	6	21.7	6	4	6	3.3	6	....	.....	4	4	6	18.3
Total	a	148	1876.3	197	26.0	145	6.0	186	6.5	134	11	26.0	53	98.0	197	19.5
	b	7	1903.0	12	199.3	11	178.5	12	186.8	11	0	0.0	0	0.0	12	12.5
State total	a	630	1878.9	819	36.6	641	8.1	780	7.1	602	31	59.5	270	779.0	819	29.4
	b	75	1902.7	97	110.7	69	68.4	86	61.9	58	1	2.0	16	172.5	97	50.6
Aggregate		705	1881.4	916	.....	710	.....	866	.....	660	32	61.5	286	951.5	916	31.6

VIRGINIA—Continued.

PROPORTIONATE DEPTHS—PIEDMONT.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Albemarle	7	1	3	11	3	....	18	Highland	3	1	5	2	....	....	8
Alexandria	2	.....	2	2	....	1	5	Lee	2	1	1	1	2	....	5
Alleghany	1	.....	.....	1	....	....	1	Loudoun	3	.....	4	3	....	....	7
Amelia	5	.....	5	9	....	....	14	Louisa	7	.....	13	7	....	....	20
Amherst	4	.....	3	8	1	....	12	Lunenburg	6	.....	13	2	....	....	15
Appomattox	4	.....	1	4	6	1	12	Madison	2	.....	3	2	....	....	5
Augusta	8	1	9	7	1	....	18	Mecklenburg	5	.....	2	9	....	....	11
Bath	4	2	7	1	....	....	10	Montgomery	4	.....	5	6	1	....	12
Bedford	12	.....	6	17	10	....	33	Nelson	1	.....	1	2	....	....	3
Bland	1	.....	1	2	....	....	3	Nottoway	4	.....	3	9	1	....	13
Botetourt	6	.....	1	6	7	....	14	Orange	2	.....	3	3	....	....	6
Brunswick	8	.....	17	2	....	....	19	Page	3	1	2	2	2	....	7
Buchanan	2	.....	6	.....	....	....	6	Patrick	3	.....	2	2	2	....	6
Buckingham	4	.....	4	7	....	....	11	Pittsylvania	7	.....	6	12	2	....	21
Campbell	5	.....	3	9	....	....	12	Powhatan	4	2	6	1	....	....	9
Carroll	5	1	4	6	1	....	12	Prince Edward	4	.....	4	5	....	....	9
Charlotte	2	.....	3	3	....	....	6	Prince William	7	1	8	9	1	....	19
Chesterfield	6	2	11	3	....	....	16	Pulaski	2	.....	2	3	1	....	6
Clarke	2	.....	2	5	....	....	7	Rappahannock	2	.....	3	1	....	....	4
Craig	2	1	1	2	....	....	4	Roanoke	2	.....	4	1	1	....	6
Culpeper	5	.....	6	3	....	....	9	Rockbridge	1	.....	2	1	....	....	3
Cumberland	4	.....	6	7	....	....	13	Rockingham	9	4	12	6	2	1	25
Dickenson	2	.....	1	.....	1	....	2	Russell	4	.....	8	3	2	....	13
Dinwiddie	4	.....	12	.....	....	....	12	Scott	3	.....	3	2	1	....	6
Fairfax	4	1	7	3	....	....	11	Shenandoah	4	.....	5	.....	1	....	6
Fauquier	5	1	7	6	1	....	15	Smyth	3	.....	3	1	5	....	9
Floyd	3	.....	3	5	1	....	9	Spotsylvania	4	.....	10	3	....	....	13
Fluvanna	2	.....	1	6	1	....	8	Stafford	4	.....	10	2	....	....	12
Franklin	1	.....	.....	3	....	....	3	Tazewell	3	.....	4	1	....	2	7
Frederick	3	1	7	1	....	....	9	Warren	3	.....	1	7	1	....	9
Giles	1	.....	2	1	....	....	3	Washington	3	.....	4	3	....	....	7
Goochland	3	.....	5	3	1	....	9	Wise	2	.....	1	.....	....	1	2
Grayson	4	.....	6	3	....	....	9	Wythe	1	2	1	.....	....	....	3
Greene	1	.....	3	.....	....	....	3								
Halifax	9	1	2	20	2	....	25	70 counties	267	24	318	297	62	6	707
Hanover	4	.....	7	5	....	....	12	Per cent	....	3.4	45.0	42.0	8.8	0.8	....
Henry	5	.....	.....	14	1	....	15								

PROPORTIONATE DEPTHS—TIDEWATER.

County.	Cor.	A.	B.	C.	E.	Total.	County.	Cor.	A.	B.	C.	E.	Total.
Accomac	5	6	8	1	.....	15	New Kent	3	.....	6	1	.....	7
Charles City	2	1	5	.....	.....	6	Norfolk	3	1	7	.....	.....	8
Caroline	7	2	8	7	1	18	Northampton	2	.....	5	.....	.....	5
Elizabeth City	1	1	1	.....	.....	2	Northumberland	3	4	2	2	.....	8
Essex	1	.....	2	1	.....	3	Prince George	5	6	5	2	.....	13
Gloucester	4	3	5	2	.....	10	Princess Anne	5	9	4	.....	.....	13
Greenesville	2	.....	3	.....	.....	3	Richmond	1	.....	.....	3	.....	3
Henrico	1	1	2	.....	.....	3	Southampton	2	2	3	.....	.....	5
Isle of Wight	3	4	5	.....	.....	9	Surry	3	.....	2	2	.....	4
James City	1	.....	3	.....	.....	3	Warwick	2	.....	6	.....	.....	6
King and Queen	1	.....	2	1	.....	3	Westmoreland	6	.....	10	6	.....	16
King George	1	2	1	.....	.....	3	York	2	2	3	1	.....	6
King William	4	3	9	2	.....	14							
Mathews	5	8	4	.....	.....	12	28 counties	79	59	117	32	1	209
Middlesex	2	2	3	1	.....	6	Per cent	....	28.2	56.0	15.3	0.5	.....
Nansemond	2	2	3	.....	.....	5							

Reporter's remarks.

Albemarle County: "One spring has failed." Amherst County: "Most wells have to be deepened." Augusta County: "One well abandoned." Bath County: "Dry weather has caused all water streams to fail this season." "Excessive rains all through June, and the water supply is good now." Bedford County: "Of late all wells bored or drilled are deeper for a full supply." Botetourt County: "A well seems to have taken a small spring a mile away." "Wells once strong now entirely dry." Brunswick County: "Some wells failed." "A spring gone dry." Buchanan County:

"One well and some springs failed." Cumberland County: "Sometimes temporary shortage in some wells resulting from pumping for railway uses." Dinwiddie County: "Several wells dug for years abandoned and new ones dug." Fairfax County: "Three wells failed." Fauquier County: "Several springs failed; most of the wells are not deep enough." "Springs that never failed before are now dry; we had more drought last year, but less water in springs this year." Fluvanna County: "Most farmers have recently had wells drilled." Giles County: "Water seems to be lower in wells than ever before; springs are about the same." Halifax County: "Several wells have gone dry." "A good many people complain of wells giving out." Hanover County: "A strong spring failed 20 years ago." Highland County: "The springs and water courses are gradually growing weaker each season as the land is cleared up and the timber removed." Louisa County: "A general tendency toward a somewhat lower water level." Nelson County: "The water in wells has been less every year since dug." Powhatan County: "The water in wells has been growing less for several years." Prince Edward County: "At time of Charleston earthquake, water level lowered about 5 feet; since then it has gradually risen." Rappahannock County: "About 30 years ago several wells were dug deeper." "Some wells are dry." Stafford County: "Two springs are weaker than they were 20 years ago." "Wells and springs of late dry up in dry seasons." Caroline County: "Water in wells has greatly diminished in the last two years, for which I can not account, except for the general clearing up of the land." Essex County: "Lots of springs are failing, and the supply of water has decreased fully one-half in the last 20 years." King and Queen County: "Drilled wells flow for a while, then have to have force pumps put on them." Mathews County: "Our people are awakening to the fact that good water means drilled wells." Surry County: The water has receded; wells now being dug have to go deeper."

The typical remarks are in accord with the schedule records. Of the 660 bi-state wells in Virginia, 286 reveal lowering of the water level and only 32 a rise; and while in a few cases the lowering is ascribed to drought, in the great majority it is recognized as proceeding year by year and affecting springs and streams no less than wells.

WASHINGTON.

County.	Dates.			Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Adams	*a*	1	1890	1	15	1	3	1	1.5	1	....	.....	1	1.5	1	13.5
	b	8	1902	8	299.7	8	91.9	8	86.9	8	....	.....	2	40	8	212.9
Asotin	*a*	3	1898	3	30	3	5.7	3	5.7	3	....	.....	....	.....	3	24.3
Benton	*a*	2	1899	2	15	2	3.5	2	3.5	2	....	.....	....	.....	2	11.5
	b	3	1907	3	256.7	3	70	3	70	3	....	.....	....	.....	3	186.7
Chehalis	*a*	9	1896	10	20.9	8	10.7	10	8.1	8	....	.....	6	15	10	12.8
	b		.....	1	350	1	350	1	350	1	....	.....	....	.....	1	0
Chelan	*a*	2	1892	2	34.5	2	3.5	2	15.5	2	2	24	....	.....	2	19
	b	1	1908	1	104	1	10	1	10	1	....	.....	....	.....	1	94
Clallam	*a*	5	1902	5	18.8	5	4.2	5	3.6	5	....	.....	2	3	5	15.2
Clarke	*a*	13	1895	21	35	11	4.5	21	4.5	11	....	.....	1	1	21	30.5
Columbia	*b*	1	1907	3	449.3	3	30	3	30	3	....	.....	....	.....	3	419.3
Cowlitz	*a*	3	1906	3	24.3	....	.....	3	5	0	....	.....	....	.....	3	19.3
Douglas	*a*	3	1903	4	23.2	2	5	4	5	2	....	.....	....	.....	4	18.2
	b	1	1907	2	150	2	34	2	29	2	....	.....	1	10	2	121
Ferry	*a*	1	1900	3	11	3	3.8	3	3.8	3	....	.....	....	.....	3	7.2
Franklin	*b*	6	1909	6	500	3	43.3	6	44.2	3	....	.....	....	.....	6	455.8
Grant	*a*	3	1907	3	28	3	14.3	3	11	3	....	.....	1	10	3	17
	b	3	1907	3	118.7	3	25	3	38.2	3	3	40	....	.....	3	80.3
Island	*a*		.....	18	37.9	3	6.3	18	7.7	3	....	.....	....	.....	18	30.2
King	*a*	12	1900	23	28.4	12	8.4	21	10.7	10	1	8	6	8	23	17.8
	b	1	1909	3	225.7	2	205	3	144.3	2	1	10	....	.....	3	81.3

WASHINGTON—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Kitsap	*a*	7	1905	11	40.7	11	7.5	11	4.9	11	....	.....	9	29	11	35.8
Kittitas	*a*	3	1900	6	20.7	3	14.7	6	4	3	....	.....	3	32	6	16.7
Klickitat	*a*	15	1899	21	22.2	15	4.2	20	5.3	14	3	4	6	9	21	16.7
	b		.....	1	121	1	60	1	60	1	....	.....	....	.....	1	61
Lewis	*a*	13	1893	19	30.3	13	6.1	19	6.5	13	2	4	3	11	19	23.8
Lincoln	*a*	8	1894	26	32.3	15	6.1	26	3.2	15	....	.....	12	60	26	29.2
	b	5	1907	11	114.4	3	42	11	27.4	3	....	.....	....	.....	11	87
Mason	*a*	6	1891	6	29.8	2	9	6	6	2	....	.....	1	2	6	23.8
Okanogan	*a*	11	1904	11	26.3	9	4	11	3.8	9	....	.....	1	1	11	22.5
Pacific	*a*	8	1898	8	15.2	4	6.5	8	4.7	4	....	.....	....	.....	8	10.6
Pierce	*a*	12	1897	37	28	9	11.1	37	7	9	....	.....	6	68	37	21
	b		.....	9	163.1	8	171	9	162.9	8	....	.....	....	.....	9	0.2
San Juan	*a*		.....	5	28	....	.....	5	5.6	0	....	.....	....	.....	5	22.4
	b		.....	3	180	3	180	3	180	3	....	.....	....	.....	3	0
Skagit	*a*	18	1898	36	23.1	14	5.3	36	7.3	14	....	.....	9	24.5	36	15.8
	b		.....	11	89.1	....	.....	11	82.2	0	....	.....	....	.....	11	6.9
Skamania	*a*	5	1908	5	28	5	5.5	4	3.7	4	....	.....	4	9.5	5	24.4
	b	1	1910	1	75	....	.....	1	20	0	....	.....	....	.....	1	55
Snohomish	*a*	10	1901	92	23.1	9	2.9	92	7.3	9	1	0.5	2	2.5	92	15.9
Spokane	*a*	27	1898	29	39.7	26	11.7	29	7.5	26	3	6	17	100.5	29	32.2
Stevens	*a*	3	1893	3	17.3	3	7.2	3	3	3	....	.....	3	12.5	3	14.3
Thurston	*a*	7	1904	10	34.6	7	6.6	10	7.9	7	2	2	1	1	10	26.7
Walla Walla	*a*	1	1893	1	35	1	7	1	4	1	....	.....	1	3	1	31
	b	5	1906	7	369.9	5	333.8	7	250.7	5	....	.....	....	.....	7	119.1
Whatcom	*a*	6	1900	56	24.8	6	6.5	56	8.2	6	1	2	....	.....	56	16.6
Whitman	*a*	10	1891	12	30	10	6.8	12	5.1	10	....	.....	5	12.5	12	24.9
	b	7	1905	10	123.2	5	98.4	8	61.9	5	....	.....	1	20	10	48
Yakima	*a*	9	1897	10	31.7	9	9.8	10	12.7	9	....	.....	1	1	10	19
	b	1	1907	1	92	1	50	1	50	1	....	.....	....	.....	1	42
Total	*a*	236	1898.3	502	27.6	226	7.2	498	6.8	222	15	50.5	101	417.5	502	20.7
	b	43	1906.0	84	210.2	52	122.7	82	95.3	52	4	50.0	4	70.0	84	114.1
Aggregate		279	1899.5	586	.....	278	.....	580	.....	274	19	100.5	105	487.5	586	34.1

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Adams	3	.....	1	.....	2	6	9	Lincoln	6	1	15	11	7	3	37
Asotin	2	.....	2	1	....	....	3	Mason	3	2	2	2	....	....	6
Benton	2	1	1	1	....	2	5	Okanogan	4	3	4	4	....	....	11
Chehalis	3	5	6	.....	....	....	11	Pacific	4	2	6	.....	....	....	8
Chelan	1	.....	2	.....	1	....	3	Pierce	38	20	18	7	1	....	46
Clallam	2	1	4	.....	....	....	5	San Juan	2	4	3	1	....	....	8
Clarke	7	.....	12	6	3	....	21	Skagit	33	24	18	5	....	....	47
Columbia	1	.....	.....	1	....	2	3	Skamania	2	.....	5	1	....	....	6
Cowlitz	1	.....	3	.....	....	....	3	Snohomish	86	21	65	5	1	....	92
Douglas	3	.....	4	1	....	1	6	Spokane	10	2	15	9	3	....	29
Ferry	1	3	.....	.....	....	....	3	Stevens	1	1	2	.....	....	....	3
Franklin	2	.....	.....	.....	....	6	6	Thurston	4	2	6	.....	2	....	10
Grant	2	.....	3	.....	2	1	6	Walla Walla	3	1	2	2	....	3	8
Island	15	6	6	3	2	1	18	Whatcom	53	16	33	7	....	....	56
King	16	8	13	3	....	2	26	Whitman	9	3	9	9	....	1	22
Kitsap	4	1	3	5	2	....	11	Yakima	4	4	4	3	....	....	11
Kittitas	2	2	3	1	....	....	6								
Klickitat	8	6	13	2	1	....	22	35 counties	344	142	293	95	28	28	586
Lewis	7	3	10	5	1	....	19	Per cent	....	24.2	50.0	16.2	4.8	4.8	....

Reporters' remarks:

Asotin County: "Wells and springs generally improve in quantity of water; experience of 30 years." Clallam County: "Extraordinarily dry summer." Clarke County: "Springs do not run as strong after the land has been cleared of timber." Kittitas County: "Water rises and falls with the amount of irrigation." Lincoln County: "The water level is getting less and less every year, especially where drilled wells are close by." "All the wells dug or drilled when the land was first settled have gone dry." Thurston County: "Draining many beaver swamps, burning over large forest

areas, and clearing are the principal causes of lowering of the original water level." Whitman County: "Water supply good as at any time in 40 years."

The averages for Washington are affected by the fact that 215 out of the 586 wells recorded for the State are from data of the State geologist, showing only the depth of wells and of water in wells without dates or changes.

WEST VIRGINIA.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Barbour	a	2	1884	5	20.6	5	6.8	5	1.8	5			5	25	5	18.8
	b	4	1908	5	76.8	4	31.5	5	24.8	4			4	22	5	52
Berkeley	a	4	1885	4	50.1	4	14.4	2	13	2			1	2.5	4	36.4
	b	6	1905	6	128.3	4	31.2	5	37	3			2	30	6	93.3
Boone	a	4	1894	10	26.4	7	9.7	10	7.3	7			3	11	10	19.1
	b	1	1908	1	72	1	25	1	25	1					1	47
Braxton	a	7	1896	20	25.8	17	9.9	15	8.9	12			7	13	20	17.2
	b	4	1904	7	87.1	6	46.5	5	28.6	4					7	44.4
Cabell	a	4	1877	10	30.4	3	9.3	10	7.3	3			3	14	10	23.1
Calhoun	a	1	1906	1	35	1	20	1	20	1					1	15
Clay	a			2	28	2	6.5	2	4.5	2			2	4	2	23.5
Doddridge	a	5	1868	5	26.4	5	13	5	11	5			1	10	5	15.4
Fayette	a	5	1902	11	40.8	9	18	10	16.4	8			3	13	11	25.5
	b	4	1904	10	86.3	6	19.3	10	28.2	6			3	19	10	58.1
Gilmer	a	13	1880	15	29	8	9.2	15	13.4	8	1	2	4	11	15	15.6
	b	2	1903	2	97	2	86.5	2	80	2			2	13	2	17
Grant	a	6	1888	8	36.4	6	17.3	8	11	6			2	26	8	24.4
Greenbrier	a	8	1876	11	36.2	3	28.7	11	8.1	3			2	36	11	28.1
	b	7	1900	7	94.9	3	31.7	7	18	3			1	35	7	76.9
Hampshire	a	9	1875	14	42.6	11	22.6	14	18.6	11	1	1	5	30	14	23.9
Hancock	b			1	50	1	50	1	50	1					1	0
Hardy	a	2	1897	6	31.8	3	13.3	6	7.3	3			3	15	6	24.5
	b	1	1894	1	100	1	30	1	25	1			1	5	1	75
Harrison	a	4	1873	15	28.6	6	15.8	15	8.3	6			3	8	15	20.3
	b	1	1900	2	115	1	40	2	35	1			1	20	2	80
Jackson	a	10	1878	15	29.8	11	12.1	14	8.7	10			4	10	15	20.3
	b			1	108	1	20	1	20	1					1	88
Jefferson	a	7	1841	10	50	7	10.4	10	5.2	7			7	39	10	44.8
	b	1	1910	2	183.5	1	60	1	150	0					2	78.5
Kanawha	a	13	1881	19	23.9	17	9.9	12	8.7	10	3	5	4	35	19	15.9
	b			1	100	1	86			0					1	14
Lewis	a	1	1910	3	32.3	3	14.3			0					3	18
	b	1	1910	1	72	1	35			0					1	37
Lincoln	a	15	1889	19	32.1	15	10.6	16	9.7	12			2	9.5	19	22.5
	b			2	143			1	36	0					1	50
Marion	a	3	1879	5	16.8	3	13.3	5	8.2	3			3	5	5	8.6
	b			2	82.5			2	35	0					2	47.5
Mason	a	3	1879	7	55.9	5	15	4	11.9	2			1	6.5	7	44.7
	b			1	100	1	45	1	40	1			1	5	1	60
McDowell	a	1	1860	2	24	2	12.5	2	11.5	2			1	2	2	12.5
Mercer	a	2	1899	3	33.2	3	12.3	3	11.3	3			1	3	3	22
	b	4	1903	5	99	5	39	5	38	5	1	5	2	10	5	61
Mineral	a	1	1890	3	15.7	3	9	3	4.3	3			3	14	3	11.3
Mingo	a			4	42.7	2	8	3	6.3	1			1	4	4	39
	b	1	1905	1	160	1	60	1	60	1					1	100
Monongalia	b			2	100	2	50			0					2	50
Monroe	a	5	1904	5	40.2	5	19.4	5	19.4	5					5	20.8
Morgan	a	4	1896	5	42.8	4	16.7	5	11.4	4			4	15	5	31.4
	b	7	1901	7	79.9	7	48.7	7	48.3	7			1	3	7	31.6
Nicholas	a	3	1887	10	28	7	6.6	9	5.7	6			3	7	10	21.6
	b	6	1903	6	77.2	4	13.7	6	21.7	4	1	5			6	55.5
Pendleton	a	4	1900	12	27.2	10	10.3	12	7.5	10	1	2	7	23	12	19.7
	b	1	1902	2	93.5	2	15	2	11.5	2			2	7	2	82
Pleasants	a	6	1891	8	31.4	6	7.2	8	6	6			6	15	8	25.4
Pocahontas	a	3	1864	3	24	3	5.3	3	4.3	3			2	3	3	19.7
Preston	a	6	1888	8	19.5	8	10.4	8	5.7	8			8	37.5	8	13.8
	b	4	1899	4	86.2	4	28.8	4	22.5	4			2	25	4	63.7
Putnam	a	3	1886	3	34.3	3	8.3	3	10.7	3	3	7			3	23.7
Raleigh	a			7	35.4	2	12	7	6.3	2			2	14	7	29.1
	b			3	83			3	31.7	0					3	51.3
Randolph	a	6	1884	10	23.7	8	6.6	10	5.5	8	2	6	5	12.5	10	18.2
	b	1	1892	1	80	1	20	1	15	1			1	5	1	65
Ritchie	a	4	1882	6	20	3	5.7	6	5.8	3					6	14.3
	b			2	107.5			2	40	0					2	67.5
Summers	a	6	1898	8	42.4	6	15.2	7	13.7	5			3	10	8	27.9
	b	2	1902	3	110.7	2	45	3	43.3	2					3	67.3

WEST VIRGINIA—Continued.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Taylor	*a* 6	1888	8	37.5	6	15.8	8	12.6	6	....	.....	3	12	8	24.9
	b	.....	2	70	2	70	....	.....	0	....	.....	....	.....	2	0
Tucker	*a* 2	1892	5	31.2	5	6	5	2.8	5	....	.....	5	16	5	28.4
Tyler	*a* 3	1886	3	58.7	3	16	3	15.3	3	....	.....	1	2	3	43.3
Upshur	*a* 8	1888	11	20.5	8	8	11	3.8	8	....	.....	5	37.5	11	16.7
	b 1	1892	2	107	1	20	1	40	0	....	.....	....	.....	2	77
Wayne	*a* 13	1877	13	26.6	13	6.3	10	7.2	10	2	8	5	7.5	13	20.3
	b 1	1895	1	125	1	35	1	40	1	1	5	....	.....	1	85
Wetzel	*a* 7	1884	11	28.6	10	11	10	9.2	9	1	2	4	25	11	20
	b 3	1906	6	76.2	5	18.2	4	22.7	3	1	2	2	7	6	59.2
Wirt	*a* 12	1884	12	25.7	12	7.8	12	6.8	12	....	.....	4	12	12	18.9
	b 3	1904	3	84.3	3	23	1	40	1	....	.....	1	10	3	64.7
Wood	*a* 10	1876	13	38.2	5	12.8	13	10.2	5	....	.....	1	2	13	28
Wyoming	*a*	.....	2	20	....	.....	2	3.5	0	....	.....	....	.....	2	16.5
	b 3	1904	5	55.4	3	9.7	5	12.4	3	....	.....	1	2	5	43
Total	*a* 241	1875.1	390	31.4	288	11.5	358	9.0	256	14	33.0	139	597.5	390	22.4
	b 69	1902.8	107	92.4	77	35.0	91	32.2	62	4	17.0	27	218.0	106	57.6
Aggregate	310	1881.3	497	.....	365	.....	449	.....	318	18	50.0	166	815.5	496	29.9

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Barbour	3	....	4	5	1	....	10	Mingo	2	....	2	2	1	....	5
Berkeley	4	....	3	....	6	1	10	Monongalia	1	....	....	2	....	....	2
Boone	4	....	10	1	....	....	11	Monroe	2	2	1	2	....	....	5
Braxton	10	....	20	5	2	....	27	Morgan	4	....	8	3	1	....	12
Cabell	3	2	6	1	1	....	10	Nicholas	5	....	9	5	2	....	16
Calhoun	1	....	1	....	....	....	1	Pendleton	5	2	9	....	3	....	14
Clay	1	....	2	....	....	....	2	Pleasants	2	....	6	2	....	....	8
Doddridge	2	1	4	....	....	....	5	Pocahontas	1	....	3	....	....	....	3
Fayette	6	....	8	10	3	....	21	Preston	5	....	8	3	....	1	12
Gilmer	5	3	14	....	....	....	17	Putnam	1	....	3	....	....	....	3
Grant	2	3	1	4	....	....	8	Raleigh	2	1	3	6	....	....	10
Greenbrier	6	1	7	5	3	2	18	Randolph	4	1	8	1	1	....	11
Hampshire	6	2	9	3	....	....	14	Ritchie	2	2	3	2	1	....	8
Hancock	1	1	....	....	....	....	1	Summers	4	....	5	5	....	1	11
Hardy	2	....	4	2	1	....	7	Taylor	4	2	5	3	....	....	10
Harrison	4	1	13	2	....	1	17	Tucker	2	....	3	2	....	....	5
Jackson	6	1	12	2	1	....	16	Tyler	1	....	....	3	....	....	3
Jefferson	4	....	4	3	5	....	12	Upshur	5	4	6	1	2	....	13
Kanawha	7	4	14	2	....	....	20	Wayne	5	1	11	1	1	....	14
Lewis	2	1	2	1	....	....	4	Wetzel	6	1	10	2	4	....	17
Lincoln	6	3	12	5	....	....	20	Wirt	5	1	11	2	....	1	15
Marion	2	3	2	2	....	....	7	Wood	5	....	9	4	....	....	13
Mason	3	1	1	3	3	....	8	Wyoming	2	1	3	2	1	....	7
McDowell	2	....	2	....	....	....	2								
Mercer	3	1	2	4	....	1	8	49 counties	171	48	284	113	43	8	496
Mineral	1	2	2	....	....	....	3	Per cent	....	9.7	57.2	22.8	8.7	1.6	....

Reporters' remarks:

Barbour County: "Water is low in most wells; showers do not seem to affect them." "More than half the dug wells go dry at times." Braxton County: "The drier the weather gets the more water we have in the good springs." Gilmer County: "Dug wells fail in time of drought." Jackson County: "It is not uncommon for springs to start unexpectedly." Jefferson County: "Record of a well successively deepened indicates lowering of water table 21 feet in 60 years." Lewis County: "Artesian wells are frequently drilled deeper." Morgan County: "Fifty years ago we had no wells; all springs. Now a greater part of the springs have gone dry." Pleasants County: "Many springs failed." Randolph County: "As the country is opened up the springs grow weaker." Tyler County: "Some springs go dry at times and some have dis-

appeared." Upshur County: "The water in the wells and springs does not hold out well of late years." Wayne County: "Forests being removed the cause of water failures. This section was well watered 30 years ago."

The tale of the remarks and records is alike—failure of springs, deepening of wells, lowering of the water table, increasing difficulty in securing the life-giving liquid.

WISCONSIN.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Adams	a	12	1891	14	34.4	11	9.1	13	6.5	10			8	29	14	28.1
Ashland	a			1	50			1	30	0					1	20
	b	3	1904	4	167.5	3	160	4	151.2	3					4	16.2
Barron	a	3	1899	7	55.1	7	7	7	3.7	7			6	23	7	51.4
	b	1	1910	1	85	1	12			0					1	73
Bayfield	a	2	1893	3	14	3	2.7	3	1.3	3			2	4	3	12.7
Brown	a	7	1887	9	37.7	6	17	9	12.7	6			3	10	9	25
	b	4	1901	4	108.2	4	80.5	2	97	2			1	48	4	39.7
Buffalo	a	4	1886	4	40.7	4	19	4	18.7	4			1	1	4	22
	b	6	1892	8	238.1	5	38	8	31.2	5			3	45	8	206.9
Burnett	a	8	1895	8	29.2	8	6.9	8	4.6	8			8	18.5	8	24.6
	b	1	1910	1	120			1	60	0					1	60
Calumet	a	5	1889	5	27.2	5	8.2	5	2.7	5			5	27.5	5	24.5
	b	5	1904	5	132	5	94	5	90	5			2	20	5	42
Chippewa	a	8	1885	10	38.4	9	8.2	10	6.4	9			4	15	10	32
	b	3	1877	5	99	5	26.2	2	23	2					5	72.8
Clark	a	8	1890	8	46	8	7.4	6	5.3	6			2	4	8	39.1
	b	5	1885	5	88.2	5	31.6	4	32.2	4			2	9	5	58.4
Columbia	a	6	1873	9	41	6	10.8	9	8.8	6			5	17	9	32.2
	b	11	1881	12	138.4	9	39.7	9	22.1	6			4	74	12	107.2
Crawford	b	10	1890	10	246.3	10	31.4	10	27.7	10			5	37	10	220
Dane	a	6	1863	6	49.2	6	9	6	4.8	6			6	25.5	6	44.3
	b	3	1882	6	150.3	6	85.7	3	41.7	3			2	11	6	66.5
Dodge	a	5	1868	7	41.1	7	17.6	7	12.6	7	1	2	5	37	7	28.6
	b	4	1878	7	92.9	4	56.2	7	56.4	4			4	30	7	36.4
Door	a	1	1890	1	26	1	4	1	2	1			1	2	1	24
	b	11	1889	12	88.1	12	28.9	12	26.4	12			7	28	12	61.5
Douglas	a	8	1902	9	26	9	15.5	9	12.9	9			6	24	9	13.1
	b	3	1903	3	138.7	3	84	3	82	3			1	6	3	56.7
Dunn	a	14	1884	14	37.5	14	9.7	11	6.3	11			10	41	14	30.7
	b	5	1897	5	85	5	29.8	5	28.8	5			2	5	5	56.2
Eau Claire	a	2	1885	2	21	2	7	2	6	2			1	2	2	15
Florence	a	3	1905	3	28	3	5	3	4.3	3			1	2	3	23.7
Fond du Lac	a	11	1879	13	35.8	13	12.4	13	9.1	13			12	44	13	26.7
	b	9	1898	9	111.6	3	58.3	9	70.2	3			1	3	9	41.3
Forest	a	6	1908	6	19.7	6	5	6	4	6			5	6	6	15.7
Grant	a	2	1887	2	43	2	18	2	15.5	2			2	5	2	27.5
	b	14	1890	16	120.1	16	29.6	15	25.7	15			8	52	16	93.8
Green	a	4	1889	4	37.2	4	20	3	11.3	3			3	38	4	26.7
	b	4	1898	4	172.5	4	36.7	3	36.8	3	1	3			4	135
Green Lake	a	1	1836	1	15	1	10	1	0	1			1	10	1	15
	b	3	1891	3	102	3	63.3	3	63.3	3					3	38.7
Iowa	a			3	33.3			3	4.7	0					3	28.7
	b	2	1891	5	147.6	2	40	5	56.6	2			1	10	5	91
Iron	a	1	1900	2	50	1	3	2	4	1					2	46
Jackson	a	5	1882	5	33.4	5	10.6	5	5.6	5			5	2.5	5	27.8
	b	2	1902	2	67.5			2	20	0					2	47.5
Jefferson	a	9	1866	10	42.9	9	34.9	10	10.6	9			9	125	10	32.3
	b	3	1897	6	104.5			6	58.5	0					6	46
Juneau	a	14	1898	14	26.4	13	12.3	14	9.9	13			8	27	14	16.4
	b	6	1892	6	127.3	3	32.3	6	34.5	3					6	92.8
Kenosha	a	1	1892	1	24	1	12	1	10	1			1	2	1	14
Kewaunee	a	6	1894	7	32.7	6	6.2	7	5.4	6			1	4	7	27.3
	b	2	1909	2	118	2	55	2	49	2			1	12	2	69
La Crosse	b	6	1901	6	188.2	3	74.7	2	79.5	2			2	10	3	39.7
Lafayette	a			3	17.7	1	16	3	9	1			1	4	3	8.7
	b	8	1881	11	125.2	8	58.1	8	38.2	5			1	5	11	71.9
Langlade	a	9	1889	12	27.3	9	6.1	12	4.8	9			5	13.5	12	22.5
	b	3	1899	3	121.7	3	9.3	3	9.3	3					3	112.3
Lincoln	a	12	1898	14	27.8	12	5.4	14	6.7	12	3	8	6	28.5	14	21
Manitowoc	a	1	1890	1	14	1	3	1	3	1					1	11
	b	5	1896	5	152.2	5	62.2	2	39	2			1	8	5	91.6
Marathon	a	7	1890	10	24.4	9	8.2	9	14.1	9			5	5.5	10	16.5
	b	5	1905	6	73.1	6	28.5	5	13.3	5			3	20	6	48
Marinette	a	9	1901	10	26.5	10	9.2	7	7.1	7			3	14	10	18.7
	b	1	1904	4	70.5	4	30.2	4	24.7	4			3	18	4	44.7

WISCONSIN—Continued.

County.		Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
		No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Marquette	a	3	1882	3	37.3	2	5.5	1	16	0					3	28.3
	b	8	1893	8	94.4	6	47.8	7	64.1	5			2	25	8	37
Milwaukee	a	1	1890	1	40	1	30	1	30	1					1	10
	b	2	1903	2	295.5	2	265.5	2	265.5	2					2	30
Monroe	a	7	1903	7	33.4	6	24.3	7	23.6	6			3	9	7	9.9
	b	5	1893	6	133.8	5	29.6	6	36.3	5			1	30	6	97.5
Oconto	a	13	1893	15	35.1	14	14.3	14	9.5	13			11	61.5	15	24.2
	b	2	1903	2	75	2	6.5	2	6.5	2					2	68.5
Oneida	a	13	1903	14	32.2	14	5.8	11	5.5	11			6	8	14	27
Outagamie	a	3	1897	3	45	3	9.7	2	4.5	2					3	35.3
	b	3	1894	3	137	3	137	3	137	3					3	0
Ozaukee	a	4	1885	4	26.5	4	10.5	4	9.5	4			2	4	4	17
	b	2	1910	2	138.5	2	130			0					2	8.5
Pepin	a	4	1893	4	21	4	6.5	4	4.6	4			4	11.5	4	16.4
	b	1	1905	1	84	1	44	1	40	1			1	4	1	44
Pierce	a	4	1879	6	31.7	5	7.4	6	4.1	5			5	17.5	6	27.5
	b	9	1892	13	192.6	9	17.9	13	23.3	9			5	21	13	169.5
Polk	a	15	1894	15	31.3	15	7.4	9	2.1	9			4	17	15	25.1
	b	6	1894	6	148.8	6	24.3	4	20.5	4			2	6	6	125.5
Portage	a	7	1893	8	22.1	8	5.9	7	3.9	7			7	16	8	18.2
Price	a	21	1898	21	34.3	21	5.5	21	4.7	21			11	21	21	29.9
Racine	a	7	1885	7	36.4	7	15.1	7	13.4	7			5	12	7	23
	b	3	1902	5	173.8	2	77.5	5	128.2	2			2	14	5	45.6
Richland	a	5	1890	5	47	5	10.2	5	7.2	5			4	16	5	39.8
	b	10	1897	10	125.9	10	33.5	8	25.6	8			5	70	10	99.4
Rock	a	5	1868	5	25.6	5	10.6	5	6.4	5			3	21	5	19.2
	b	9	1892	9	128.1	9	60.9	9	39.2	9			4	195	9	88.9
Rusk	a	3	1903	3	38.3	3	4.3	3	0.7	3			3	11	3	37.7
St. Croix	a	5	1887	7	35.6	7	8.9	7	5.4	7			6	24.5	7	30.2
	b	7	1896	7	166.6	7	25	5	21.2	5			4	19	7	144.3
Sauk	a	6	1882	12	53.4	11	10.2	12	5.1	11	2	3	7	58.5	12	43.3
	b	2	1895	5	97.2	4	18.7	3	5.3	2			2	13	5	81.6
Sawyer	a	6	1903	6	24.8	6	5.2	5	4.2	5			3	5	6	20.5
Shawano	a	9	1895	9	29.7	8	16.7	7	11.3	6			4	38	9	18.4
	b	6	1896	6	105.8	6	41.8	5	35.8	5			3	60	6	74
Sheboygan	a	3	1882	4	30.7	3	9.7	4	7.2	3			2	4	4	23.5
	b	6	1894	7	117.1	6	81.7	7	71.7	6			3	20	7	45.4
Taylor	a	10	1896	11	23.4	11	5.5	11	4.5	11			5	10	11	18.8
	b	1	1898	3	94.7	1	50	3	36.7	1					3	58
Trempealeau	a	2	1872	2	45	2	22.5	2	9	2			2	27	2	36
	b	1	1910	1	150	1	100			0					1	50
Vernon	b	12	1895	13	211.6	13	70.5	13	68.2	13			2	30	13	143.4
Walworth	a	4	1875	4	39	4	9	3	2.3	3			3	19	4	34.7
	b	3	1892	3	126.7	3	85	1	185	1					3	41.7
Washburn	a	9	1904	9	48.1	9	5.1	9	3.3	9			5	16	9	44.8
Washington	a	6	1885	8	49.4	8	12.9	8	10.1	8			5	22.5	8	39.3
	b	6	1892	7	100.9	7	33.9	7	29.6	7			3	30	7	71.3
Waukesha	a	8	1882	9	38.8	8	8.3	9	6.7	8			8	26	9	32.1
	b	2	1907	3	100.7	2	55	2	60	1			1	30	3	54
Waupaca	a	4	1874	7	27.3	6	7	5	4.5	4			4	15	7	22.7
	b	2	1906	3	103.3	2	66.5	3	75	2			1	8	3	28.3
Waushara	a	4	1877	4	25.5	4	11.2	4	10	4			3	5	4	15.5
	b	5	1873	4	67.8	4	67	3	0	3			3	190	5	38.8
Winnebago	a	4	1874	4	34	4	10.7	4	7.4	4			4	13.5	4	26.6
	b	7	1894	8	93.1	8	63	8	58.1	8			4	39	8	35
Wood	a	6	1896	7	20.7	6	9.4	7	7.4	6			6	15	7	13.4
	b	3	1894	4	74.5	4	42.7	4	41.5	4			1	5	4	33
Total	a	401	1890.0	462	33.9	426	10.2	431	7.5	396	6	13.0	276	1,158.5	462	26.4
	b	271	1893.6	317	133.4	264	50.6	274	47.0	224	1	3.0	103	1,260.0	315	83.4
Aggregate		672	1891.4	779		690		705		620	7	16.0	379	2,418.5	777	49.5

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Adams	5		10	4			14	Clark	5		3	7	3		13
Ashland	1	1	4				5	Columbia	8	1	5	5	6	4	21
Barron	3		2	2	4		8	Crawford	4		1		2	7	10
Bayfield	1	1	2				3	Dane	5		3	3	6		12
Brown	4	1	8	2	2		13	Dodge	4		8	4	2		14
Buffalo	3		4	2	1	5	12	Door	5		2	8	1	2	13
Burnett	3		6	2	1		9	Douglas	5	4	5	2		1	12
Calumet	3		7	2	1		10	Dunn	7	1	8	6	4		19
Chippewa	5		8	4	2	1	15	Eau Claire	1		2				2

WISCONSIN—Continued.

PROPORTIONATE DEPTHS—Continued.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Florence	1	1	1	1	....	....	3	Pierce	7	....	4	2	3	10	19
Fond du Lac	7	....	13	7	2	....	22	Polk	6	....	12	4	2	3	21
Forest	2	1	5	....	....	....	6	Portage	4	....	7	1	....	....	8
Grant	6	....	1	6	5	6	18	Price	7	1	11	8	1	....	21
Green	3	....	3	2	1	2	8	Racine	4	2	3	6	1	....	12
Green Lake	2	....	2	1	1	....	4	Richland	6	....	2	6	1	6	15
Iowa	4	....	2	2	2	2	8	Rock	5	1	5	2	2	4	14
Iron	1	....	....	2	....	....	2	Rusk	1	....	....	3	....	....	3
Jackson	2	....	4	3	....	....	7	St. Croix	5	1	3	3	2	5	14
Jefferson	4	1	5	10	....	....	16	Sauk	7	....	6	3	6	2	17
Juneau	8	5	7	4	1	3	20	Sawyer	2	1	3	2	....	....	6
Kenosha	1	....	1	....	....	....	1	Shawano	5	1	7	3	3	1	15
Kewaunee	4	1	4	2	2	....	9	Sheboygan	4	1	4	4	2	....	11
La Crosse	2	....	1	2	....	....	3	Taylor	4	3	7	3	1	....	14
Lafayette	4	2	1	6	4	1	14	Trempealeau	1	....	1	2	....	....	3
Langlade	5	2	6	5	....	2	15	Vernon	5	3	....	....	....	10	13
Lincoln	4	....	12	2	....	....	14	Walworth	2	....	2	5	....	....	7
Manitowoc	2	....	1	1	1	3	6	Washburn	3	....	4	2	3	....	9
Marathon	6	2	8	5	1	....	16	Washington	5	2	3	5	2	3	15
Marinette	5	3	6	4	1	....	14	Waukesha	4	....	7	4	1	....	12
Marquette	4	4	....	5	2	....	11	Waupaca	4	1	6	3	....	....	10
Milwaukee	1	....	3	....	....	....	3	Waushara	3	3	3	2	1	....	9
Monroe	5	4	3	2	1	3	13	Winnebago	5	4	3	3	1	1	12
Oconto	7	1	10	4	2	....	17	Wood	4	5	2	4	....	....	11
Oneida	6	....	7	7	....	....	14								
Outagamie	2	3	1	2	....	....	6	70 counties	277	71	307	219	93	87	777
Ozaukee	2	1	5	....	....	....	6	Per cent	....	9.1	39.5	28.2	12.0	11.2	....
Pepin	2	2	2	1	....	....	5								

Reporters' remarks.

Adams County: "Water has settled in the last 20 years about 3 to 4 feet." "Water level seems to be some 5 or 6 feet lower than 50 years ago; think it decreased this much in the first 20 years after settlement." Barron County: "Water has been falling in most wells for the past 6 or 7 years, and a great many are being drilled to deep water." Bayfield County: "After the forests have gone the water diminishes." Brown County: "Several springs have failed." Burnett County: "Water level lowered about 4 feet in 25 years." Clark County: "Shallow wells gave out about 15 years ago." Columbia County: "Wells have all been deepened; the water supply failed and they had to be made deeper." "Nearly all wells have been deepened from what they were previous to 1875." "The ground water is going lower all the time." "Two springs failed." Crawford County: "Wells 200 feet or less have required deepening." Dodge County: "The water in wells is quite a little lower than years ago." Dunn County: "Water is 4 feet lower generally than before the country was cultivated." Grant County: "Water on an average in drilled wells is about 15 to 20 feet lower than it was 15 or 20 years ago." Green County: "Limestone wells do not supply the water they formerly did." Green Lake County: "Most of the springs gone dry and the water level about 10 feet below that of 1836." Juneau County: "Fifty years ago all the farmers got water from springs or very shallow wells; as the land became cleared those went dry and now all the water supply is from drilled wells at depths from 100 to 200 feet." Kewaunee County: "Water in wells rises with east wind (Lake Michigan 4 miles distant)." La Crosse County: "The water stage in wells has fallen from 5 to 6 feet on an average." Lafayette County: "Water level higher than usual owing to unusually heavy snowfall." "Water level is higher now than it has been for some years." "Sixty-eight years ago springs were numerous; wells, when they had to dig, were shallow—20 feet was a deep well, now most wells over 100 feet." Lincoln County: "Ground water level has in the last 4 years gone down 6 to 8 feet on account of 3 dry seasons and land clearing." Marathon County: "All dug wells gave out and most of them got dry; the old wells naturally give out as soon as the country is cleared and opened." "Since clearing began springs have

dried, wells have been deepened, and water level has changed." Marinette County: "Three dug wells failed." Monroe County: "Hundreds of wells have had to be lowered; several springs disappeared, but 3 have reappeared." Oconto County: "The more the timber is cleared off the country the deeper to go for water." Portage County: "Wells fell short; we go a little deeper; lakes are a great deal lower." Price County: "Wells dug years ago do not hold the same depth of water as when timber was standing thickly, but are drying gradually as the land is cultivated." Racine County: "Ninety-five per cent of dug wells went dry in the last 20 years; replaced by drilled wells." Richland County: "The ground level of our water is now about 8 feet lower than it was 40 years ago." "Several springs have dried up in the last 15 years." Sauk County: "The water level here is settling slowly but surely." "The springs and swamps are fast going dry; the streams are only half the size of 50 years ago." Trempealeau County: "A number of springs have failed." Washington County: "A spring weakened when wells were drilled, but after a dozen years regained full flow." Waukesha County: "Some wells and springs have dried up and some wells have been dug deeper." Winnebago County: "The water in all wells has lowered; a good many wells that were dug and supplied abundant water do not meet the demand and have to be drilled." Flowing wells decreasing." Wood County: "Forty-one years ago the land was covered with woods and was full of surface water which was gathered in shallow wells from 4 to 16 feet deep; about 15 years later the same wells would be dug 10 or 12 feet deeper, and again later nearly all wells were drilled and are now from 40 to 140 feet deep, but keep the water supply at about the same stage." "A spring supplied my stock with water for 4 or 5 years, but is now dry, and I crop the ground where it was 20 years ago."

The remarks throw a clear light on the records for Wisconsin which reveal rapid lowering in the level of ground water in nearly every part of the State. An exceptional number of reporters estimate the rate of lowering, and on the whole these estimates are strikingly consistent with the figures for the entire State.

WYOMING.

County.	Dates.		Wells.		Original water.		Present water.		Bi-state.	Rise.		Fall.		Water table.	
	No.	Mean.	No.	Mean.	No.	Mean.	No.	Mean.		No.	Sum.	No.	Sum.	No.	Mean.
Albany	*a* 8	1903	10	25.6	8	10	10	8.7	8	....	.....	3	2.5	10	16.8
	b 2	1910	2	75	....	.....	2	10	0	....	.....	....	.....	2	65
Bighorn	*a* 4	1906	6	19.7	4	10	6	8.3	4	1	1.5	1	0.5	6	11.3
	b 11	1908	11	121.8	9	57.2	10	62.5	8	....	.....	2	42	11	49.9
Carbon	*a* 3	1906	5	29.4	3	4.7	5	3.4	3	....	.....	....	.....	5	26
	b	.....	1	210	1	3	1	3	1	....	.....	....	.....	1	207
Converse	*a* 9	1903	9	32.7	9	7.9	8	7.5	8	....	.....	2	5	9	25.3
	b 7	1903	7	113.1	5	47.2	7	47.9	5	....	.....	....	.....	7	65.3
Crook	*a* 15	1906	15	27.9	15	6.8	15	7.1	15	2	5	1	1	15	20.9
	b 2	1909	2	87.5	2	57.5	2	62.5	2	1	10	....	.....	2	25
Fremont	*a* 8	1907	8	22.6	7	8.5	8	8.4	7	1	1	....	.....	8	14.1
	b 10	1907	10	150.9	7	56.6	10	56.9	7	....	.....	1	2	10	94
Johnson	*a* 4	1907	4	14	4	2.9	4	3	4	1	0.5	....	.....	4	11
Laramie	*a* 9	1898	9	34.6	7	4.1	9	5.3	7	1	1.5	1	1	9	29.2
	b 14	1905	14	259.4	12	68	13	76.2	11	....	.....	....	.....	14	174.4
Natrona	*a* 2	1902	4	32.7	2	6	4	9	2	1	12	....	.....	4	23.7
Sheridan	*a* 6	1906	7	19.1	6	4.8	7	4.6	6	....	.....	....	.....	7	14.6
	b 5	1904	5	75.8	5	40	3	31.7	3	....	.....	....	.....	5	35.8
Sweetwater	*a* 1	1909	1	32	1	8	1	8	1	....	.....	....	.....	1	24
	b	.....	2	152.5	1	15	2	17.5	1	....	.....	....	.....	2	135
Uinta	*a* 5	1896	5	14	5	4.2	5	5.1	5	2	8	3	3.5	5	8.9
	b 1	1895	1	200	1	200	1	200	1	....	.....	....	.....	1	0
Weston	*a* 3	1905	3	23	3	5	3	5	3	....	.....	....	.....	3	18
Total	*a* 77	1903.9	86	25.8	74	6.6	85	6.6	73	9	29.5	11	13.5	86	19.2
	b 52	1905.7	55	158.0	43	58.0	51	58.8	39	1	10.0	3	44.0	55	95.0
Aggregate	129	1904.6	141	.....	117	.....	136	.....	112	10	39.5	14	57.5	141	48.7

WYOMING—Continued.

PROPORTIONATE DEPTHS.

County.	Cor.	A.	B.	C.	D.	E.	Total.	County.	Cor.	A.	B.	C.	D.	E.	Total.
Albany	4	4	3	3	2	....	12	Natrona	3	1	1	2	....	....	4
Bighorn	9	4	4	6	3	....	17	Sheridan	4	3	7	....	2	....	12
Carbon	2	2	2	....	1	1	6	Sweetwater	1	....	1	....	....	2	3
Converse	6	2	6	5	1	2	16	Uinta	2	4	2	....	....	....	6
Crook	8	5	8	4	....	....	17	Weston	1	....	2	1	....	....	3
Fremont	7	6	1	5	3	3	18								
Johnson	2	2	2	....	....	....	4	13 counties	58	34	44	28	14	21	141
Laramie	9	1	5	2	2	13	23	Per cent	....	24.1	31.2	19.9	9.9	14.9	....

Reporter's remarks:

Converse County: "The water is on an approximate level for 25 miles north and south and also east and west."

Other remarks bring out the influence of irrigation on wells located in valleys; on the average the water level has risen in dug wells, but lowered to a greater extent in the relatively few drilled wells reported.

RECAPITULATION BY STATES.

While the well data doubtless attain their greatest value in relation to their respective counties (especially those in which the number of records approaches or exceeds the average), instructive relations are brought out by a recapitulation for the entire country as in the accompanying table (pp. 161–163).

For the 28,906 wells recorded the dates number but 21,792, or a trifle over 75 per cent; this impairs somewhat the accuracy of the mean dates used in computing the rate of change in water level—yet since the lacunæ are fairly uniform in distribution (though fewest in States yielding the largest records) the possible error due to lack of dates would appear to be inconsiderable.

Of the aggregate number of wells recorded, 20,650 (71.4 per cent) give the level of water at two dates, and are classed as bi-state; of these a little less than half (9,541, or 46.2 per cent) show change, while 11,109 show no change in the stage of water. The ratio of bi-state wells showing change varies widely from State to State and also with class of wells; of the bi-state dug wells, 53.6 per cent show change, while of the bi-state drilled wells only 23.4 per cent indicate change, though the amount of change is so much greater in the drilled wells that they form the more sensitive measure for mean alteration in the water level. Throughout the tabular recapitulation the absolute change is reckoned by dividing the aggregate amount of rise and lowering by the number of wells showing such change; then the mean minimum change is reckoned from the aggregate lowering, less the aggregate rise, divided by the number of bi-state wells, and the resulting figure is also reduced to the rate of change per decade through divi-

sion by the mean period between the original date and the end of 1910. The footings show that of the 15,406 bi-state dug wells, 7,025 absolutely lowered in water to the mean amount of 4.31 feet during the period covered by the records, while only 1,228 (17.5 per cent of the number lowered) show a mean rise of 3.68 feet; and that of the 5,244 bi-state drilled wells, 1,115 lowered to the mean amount of 12.83 feet, while only 173 (15.5 per cent of the number lowered) gave a mean rise of 11.08 feet. The minimum lowering per decade for the entire country is but 0.677 foot for the dug wells and over three times as much, or 2.167 feet, for the drilled wells; though the dug wells are so much more numerous that the aggregate mean minimum lowering for both classes is only 0.892 foot per decade, the greater sensitiveness of the drilled wells to change being more than counterbalanced by the preponderance in number of the dug wells changed.

Of the 28,906 wells, 28,797 (all but 109) show the depth of the water table below the surface. This depth is, of course, much greater for drilled than for dug wells, the mean for the former being 24.3 feet and for the latter 71 feet; but again the number of the former class so far preponderates as to reduce the mean for both classes of wells to 37 feet. The figures, of course, vary widely from State to State. For dug wells the range is from 13 feet in Vermont, and a fraction of a foot more in Maine and New Hampshire, to 33.7 feet in Georgia. For the drilled wells tabulated (many of those recorded were not incorporated) the range—excluding a few sporadic cases—is from 21.1 feet in Florida to 111.8 feet in Nebraska, where no fewer than 650 wells show this average.

The proportionate depths of the water table are similarly recapitulated by States and show that of the 28,797 no fewer than 17,618 (or over 61 per cent of the aggregate) are within 30 feet of the surface. Of all the wells tabulated, only 1,635 (5.7 per cent) indicate a water table below 100 feet from the surface, nearly a fifth of these (307) being in Nebraska. Had the inquiry been directed primarily to the determination of the water level, regardless of its applications, and had all the deep-well records been tabulated, the figures would be somewhat, though not greatly, different. But since the purpose throughout was to determine the agricultural water table rather than that for wells alone, deep borings were excluded whenever they were found to dominate and control averages in their respective counties and States. Of course, too, the tabulated depth of the water table in each county and State, being based on the records of wells, is below the agricultural water table by an amount which can not be determined in the present state of knowledge, but may be estimated at 2 or 3 feet. In other words, while the mean well water table of the country developed from the records is 37 feet, the agricultural water table may be averaged at 35.5 feet.

Recapitulation by States.

		Dates.		Wells.		Aggregate.	Unchanged.	Bi-state wells.									Water table.	
								Per cent changed.	Rise.		Fall.		Average change.					
		No.	Mean.	No.	Mean.				No.	Mean.	No.	Mean.	No.	Mean.	Total.	Per decade.	No.	Mean.
Alabama	*a*	395	1887.7	547	36.1	398	188	52.8	33	1.89	177	3.05	210	2.04	1.08	0.482	547	29.9
	b	33	1897.4	51	132.8	31	19	38.7	2	0.75	10	10.70	12	8.42	3.26	2.587	51	49.4
Arizona	*a*	31	1902.7	33	27.1	30	19	36.7	5	3.50	6	2.67	11	−0.14	−0.05	−0.068	33	19.1
	b	11	1901.0	11	134.6	10	5	50.0	4	10.00	1	1.00	5	−7.80	−3.90	−4.382	11	176.1
Arkansas	*a*	612	1890.9	821	30.6	568	300	47.2	67	1.91	201	3.42	268	2.08	0.98	0.515	821	22.7
	b	126	1900.2	176	116.3	120	98	18.8	2	5.00	20	7.97	22	6.80	1.25	1.269	176	47.3
California	*a*	269	1889.0	351	40.7	255	148	41.2	27	5.46	80	3.74	107	1.42	0.59	0.285	351	27.5
	b	115	1899.0	140	195.0	110	78	29.1	4	5.25	28	17.36	32	14.53	4.23	3.843	138	59.7
Colorado	*a*	194	1899.0	251	30.0	181	122	32.6	38	6.80	21	1.38	59	−3.89	−1.27	−1.153	251	22.1
	b	132	1904.4	163	197.4	113	93	17.7	6	13.50	14	16.43	20	7.45	1.32	2.354	163	109.4
Connecticut	*a*	26	1819.4	38	21.9	23	5	78.3	0	0	18	2.81	18	2.81	2.20	0.242	38	17.1
	b	4	1906.7	5	163.0	5	4	20.0	0	0	1	5.00	1	5.00	1.00	3.030	5	40.0
Delaware	*a*	36	1881.1	75	28.0	42	22	47.6	0	0	20	2.50	20	2.50	1.19	0.412	75	19.6
	b	3	1898.3	9	138.8	2	2	0	0	0	0	0	0	0	0	0	9	29.6
Florida	*a*	193	1894.6	272	25.8	155	61	60.6	47	2.40	47	3.83	94	0.71	0.43	0.281	272	18.1
	b	45	1903.5	73	163.5	25	19	24.0	0	0	6	5.83	6	5.83	1.40	2.154	73	21.1
Georgia	*a*	495	1882.6	775	39.6	579	201	64.9	46	1.99	332	2.97	378	2.37	1.54	0.564	775	33.7
	b	22	1902.4	48	273.5	23	18	21.7	0	0	5	21.40	5	21.40	4.68	6.121	48	54.3
Idaho	*a*	162	1899.4	206	31.6	177	72	59.3	55	6.53	50	3.75	105	−1.63	−0.96	−0.909	206	22.3
	b	79	1906.6	105	223.9	69	54	21.7	11	14.91	4	5.00	15	−9.60	−2.09	−6.138	105	110.4
Illinois	*a*	710	1879.6	927	29.1	734	286	61.0	47	1.97	401	5.12	448	4.38	2.67	0.879	927	18.9
	b	230	1896.1	297	122.5	191	140	26.7	7	5.00	44	15.00	51	12.25	3.27	2.354	297	46.2
Indiana	*a*	419	1879.0	576	26.6	445	153	65.6	25	1.86	267	4.70	292	4.14	2.72	0.876	576	17.9
	b	301	1898.8	363	96.3	212	138	34.9	1	3.00	73	9.47	74	9.30	3.25	2.900	363	40.8
Iowa	*a*	768	1875.0	895	36.1	711	318	55.3	20	4.17	373	6.71	393	6.16	3.40	0.972	895	24.1
	b	535	1894.8	632	153.0	449	314	30.1	7	8.93	128	14.30	135	13.10	3.93	2.588	607	78.7
Kansas	*a*	758	1886.6	911	32.6	727	462	36.5	128	4.21	137	3.37	265	−0.29	−0.11	−0.042	911	22.7
	b	323	1895.7	406	126.4	293	250	14.7	14	22.32	29	12.86	43	1.41	0.21	0.144	406	90.4
Kentucky	*a*	491	1885.2	685	30.4	514	206	59.9	46	2.12	262	4.25	308	3.30	1.98	0.798	685	22.3
	b	88	1899.9	120	102.6	81	48	40.7	8	8.75	25	8.92	33	4.64	1.89	1.870	120	70.2
Louisiana	*a*	213	1893.6	327	28.0	204	99	51.5	16	1.78	89	2.84	105	2.13	1.10	0.670	327	21.5
	b	47	1901.1	81	182.4	47	40	14.9	0	0	7	16.86	7	16.86	2.95	3.315	81	28.4
Maine	*a*	38	1874.9	45	18.6	34	10	70.6	0	0	24	2.44	24	2.44	1.72	0.490	45	13.8
	b	6	1893.0	6	96.5	5	5	0	0	0	0	0	0	0	0	0	6	28.0
Maryland	*a*	113	1872.6	148	34.1	110	34	69.1	2	1.00	74	4.25	76	4.11	2.84	0.760	148	28.6
	b	16	1897.5	29	207.9	15	8	46.7	0	0	7	19.00	7	19.00	8.87	7.093	28	53.4
Massachusetts	*a*	35	1851.1	59	22.0	35	17	51.4	1	0.50	17	3.94	18	3.69	1.90	0.323	59	18.6
	b	3	1903.0	3	135.0	3	2	33.3	0	0	1	5.00	1	5.00	1.67	2.395	3	91.7

Recapitulation by States—Continued.

	Dates.		Wells.		Aggregate.	Unchanged.	Bi-state wells.									Water table.	
							Per cent changed.	Rise.		Fall.		Average change.					
	No.	Mean.	No.	Mean.				No.	Mean.	No.	Mean.	No.	Mean.	Total.	Per decade.	No.	Mean.
Michigan	*a* 567	1886.2	681	30.2	525	282	46.3	14	1.71	229	4.24	243	3.91	1.81	0.760	672	22.1
	b 348	1898.0	393	109.6	269	199	26.0	1	1.00	69	9.64	70	9.49	2.47	2.062	381	51.9
Minnesota	*a* 607	1894.2	677	31.9	565	143	74.7	22	3.66	400	5.66	422	5.18	3.87	2.447	677	23.5
	b 415	1898.2	492	144.7	348	254	27.0	4	6.00	90	12.31	94	11.53	3.11	2.640	469	75.0
Mississippi	*a* 509	1887.0	681	41.4	465	313	32.7	14	1.79	138	3.30	152	2.90	0.95	0.412	678	32.6
	b 86	1896.2	140	348.6	92	77	16.3	0	0	15	8.97	15	8.97	1.46	1.059	137	60.7
Missouri	*a* 839	1884.1	1,127	31.6	779	490	37.1	111	3.37	178	4.69	289	1.60	0.59	0.229	1,127	21.2
	b 308	1900.0	400	134.9	269	220	18.2	9	6.89	40	14.97	49	10.96	2.00	1.996	393	69.2
Montana	*a* 26	1896.9	29	28.3	19	13	31.6	3	2.00	3	1.00	6	−0.50	−0.16	−0.121	29	23.2
	b 7	1897.9	11	231.2	5	5	0	0	0	0	0	0	0	0	0	11	88.0
Nebraska	*a* 446	1891.9	589	42.6	396	267	32.6	59	5.08	70	3.63	129	−0.36	−0.12	−0.064	589	29.2
	b 497	1899.1	650	159.7	429	374	12.8	13	6.92	42	4.27	55	1.63	0.21	0.162	650	111.8
Nevada	*a* 15	1901.5	30	27.8	16	6	62.5	5	5.30	5	3.50	10	−0.90	−0.56	−0.662	30	20.7
	b 1	1910.0	4	149.0	0	0	0	0	0	0	0	0	0	0	0	4	36.7
New Hampshire	*a* 20	1845.3	24	19.7	18	4	77.8	0	0	14	5.14	14	5.14	4.00	0.618	24	13.4
	b 1	1890.0	1	200.0	1	0	100	0	0	1	6.00	1	6.00	6.00	3.000	1	150.0
New Jersey	*a* 150	1859.2	205	29.3	135	52	61.5	3	2.00	80	4.86	83	4.61	2.84	0.586	205	21.6
	b 16	1904.9	27	126.9	13	8	38.5	0	0	5	4.20	5	4.20	1.62	3.167	26	37.3
New Mexico	*a* 81	1902.0	118	31.3	84	41	51.2	17	7.50	26	3.86	43	−0.64	−0.33	−0.409	118	24.7
	b 82	1906.5	99	184.3	68	60	11.2	2	33.00	6	23.17	8	9.12	1.07	3.067	99	106.8
New York	*a* 496	1863.1	648	24.9	475	166	65.1	4	4.75	305	4.74	309	4.62	3.01	0.641	648	18.5
	b 76	1900.4	96	117.4	56	42	25.0	1	5.00	13	10.92	14	9.79	2.45	2.548	96	51.6
North Carolina	*a* 549	1885.1	765	34.4	523	235	55.1	31	1.65	257	2.61	288	2.15	1.18	0.475	765	28.4
	b 22	1903.9	41	134.3	20	19	5.0	0	0	1	10.00	1	10.00	0.50	0.820	39	35.9
North Dakota	*a* 551	1900.0	651	32.4	566	273	51.8	31	2.57	262	4.44	293	3.70	1.92	1.916	651	24.4
	b 230	1904.6	289	192.2	223	171	23.3	14	6.93	38	10.93	52	6.12	1.43	2.645	289	55.3
Ohio	*a* 700	1873.5	907	27.4	719	283	60.6	8	2.25	428	4.09	436	3.98	2.41	0.661	907	19.2
	b 256	1897.2	336	92.1	189	142	24.9	2	4.50	45	10.31	47	9.68	2.41	1.880	336	40.0
Oklahoma	*a* 468	1900.0	592	32.0	469	210	55.2	71	6.21	188	5.01	259	1.93	1.07	1.069	592	23.4
	b 250	1903.2	296	119.3	228	153	32.9	23	17.04	52	13.31	75	4.00	1.32	1.935	296	80.4
Oregon	*a* 184	1890.7	233	28.1	181	92	49.1	14	9.96	75	4.50	89	2.22	1.09	0.567	233	21.7
	b 18	1904.8	22	280.5	16	13	18.7	1	30.00	2	15.25	3	0.17	0.03	0.060	22	148.5
Pennsylvania	*a* 299	1866.8	415	31.2	295	73	75.3	4	3.75	218	4.81	222	4.66	3.51	0.811	415	24.1
	b 97	1899.6	146	111.7	74	39	47.3	3	10.00	32	16.03	35	13.80	6.53	6.276	146	63.3
Rhode Island	*a* 17	1830.8	20	25.5	17	9	47.1	0	0	8	4.81	8	4.81	2.26	0.286	20	21.1
South Carolina	*a* 308	1882.1	417	37.1	298	125	64.6	26	1.52	147	3.14	173	2.44	1.42	0.507	417	30.9
	b 27	1902.2	37	215.2	23	19	17.4	0	0	4	2.12	4	2.12	0.37	0.474	35	32.0
South Dakota	*a* 370	1897.3	485	36.7	362	170	53.0	36	3.71	156	5.08	192	3.43	1.82	1.433	485	26.4
	b 169	1900.2	281	516.1	219	197	10.0	3	8.67	19	20.37	22	16.41	1.65	1.682	280	46.0

Tennessee	*a* 410	1888.5	579	37.7	395	176	55.4	9	1.89	210	3.44	219	3.22	1.78	0.830	579	29.7
	b 108	1902.6	179	108.0	92	59	35.2	1	10.00	32	7.87	33	7.33	2.63	3.555	179	69.2
Texas	*a* 572	1890.7	848	34.7	570	315	44.7	48	3.86	207	4.22	255	2.70	1.21	0.635	848	27.8
	b 344	1901.6	538	233.8	353	282	22.7	18	10.44	53	29.96	71	19.72	3.97	4.721	523	87.0
Utah	*a* 49	1895.4	60	34.4	41	8	80.5	20	8.20	13	4.73	33	−3.11	−2.50	−1.712	60	22.4
	b 9	1902.1	19	360.5	16	15	6.2	1	5.00	0	0	1	−5.00	−0.31	−0.396	19	26.6
Vermont	*a* 18	1845.1	47	17.4	22	7	68.2	0	0	15	5.07	15	5.07	3.45	0.532	47	13.0
	b 2	1896.5	2	79.0	2	2	0	0	0	0	0	0	0	0	0	2	11.5
Virginia	*a* 630	1878.9	819	36.6	602	301	50.0	31	1.92	270	2.89	301	2.39	1.20	0.384	819	29.4
	b 75	1902.7	97	110.7	58	41	29.3	1	2.00	16	10.78	17	10.03	2.94	4.027	97	50.6
Washington	*a* 236	1898.3	502	27.6	222	106	52.3	15	3.37	101	4.13	116	3.16	1.65	1.413	502	20.7
	b 43	1906.0	84	210.2	52	44	15.4	4	12.50	4	17.50	8	2.50	0.38	0.962	84	114.1
West Virginia	*a* 241	1875.1	390	31.4	256	103	59.8	14	2.36	139	4.30	153	3.04	2.21	0.632	390	22.4
	b 69	1902.8	107	92.4	62	31	50.0	4	4.25	27	8.07	31	6.48	3.24	4.500	106	57.6
Wisconsin	*a* 401	1890.0	462	33.9	396	114	71.2	6	2.17	276	4.20	282	4.06	2.89	1.446	462	26.4
	b 271	1893.6	317	133.4	224	120	46.4	1	3.00	103	12.23	104	12.09	5.61	3.422	315	83.4
Wyoming	*a* 77	1903.9	86	25.8	73	53	27.4	9	3.28	11	1.23	20	−0.80	−0.22	−0.359	86	19.2
	b 52	1905.7	55	158.0	39	35	10.3	1	10.00	3	14.67	4	8.50	0.87	2.027	55	95.0
Total	*a* 15,794	1885.3	21,029	32.7	15,406	7,153	53.6	1,228	3.68	7,025	4.31	8,253	3.12	1.67	0.677	21,017	24.3
	b 5,998	1899.1	7,877	164.2	5,244	3,956	23.4	173	11.08	1,115	12.83	1,288	9.62	2.36	2.167	7,780	71.0
Aggregate	21,792	1889.3	28,906	.....	20,650	11,109	46.2	1,401	4.60	8,140	5.48	9,541	4.00	1.85	0.892	28,797	37.0

Proportionate depths by States.

State.	A.		B.		C.		D.		E.		Total.
	No.	Per ct.	No.	Per ct.	No.	Per ct.	No.	Per ct.	No.	Per ct.	
Alabama	21	3.5	339	56.7	190	31.8	45	7.5	3	0.5	598
Arizona	6	13.6	21	47.7	10	22.7	1	2.3	6	13.6	44
Arkansas	79	7.9	619	62.1	250	25.1	39	3.9	10	1.0	997
California	97	19.8	231	47.2	87	17.8	40	8.2	34	7.0	489
Colorado	73	17.6	158	38.2	59	14.3	48	11.6	76	18.3	414
Connecticut	12	27.9	25	58.2	5	11.6	0	0	1	2.3	43
Delaware	10	11.9	61	72.6	11	13.1	2	2.4	0	0	84
Florida	121	35.1	157	45.5	59	17.1	7	2.0	1	0.3	345
Georgia	53	6.4	367	44.6	315	38.3	81	9.8	7	0.9	823
Idaho	73	23.5	110	35.4	48	15.4	31	10.0	49	15.7	311
Illinois	179	14.6	748	61.1	203	16.6	79	6.5	15	1.2	1,224
Indiana	137	14.6	549	58.4	180	19.2	60	6.4	13	1.4	939
Iowa	150	10.0	642	42.7	373	24.8	198	13.2	139	9.3	1,502
Kansas	135	10.3	605	45.9	290	22.0	165	12.5	122	9.3	1,317
Kentucky	82	10.2	465	57.8	186	23.1	59	7.3	13	1.6	805
Louisiana	70	17.1	246	60.3	75	18.4	15	3.7	2	0.5	408
Maine	13	25.5	34	66.7	3	5.9	1	1.9	0	0	51
Maryland	31	17.6	66	37.5	62	35.2	13	7.4	4	2.3	176
Massachusetts	12	19.4	40	64.5	8	12.9	1	1.6	1	1.6	62
Michigan	181	17.2	514	48.8	213	20.2	84	8.0	61	5.8	1,053
Minnesota	146	12.7	488	42.6	279	24.3	136	11.9	97	8.5	1,146
Mississippi	85	10.4	376	46.1	215	26.4	115	14.1	24	3.0	815
Missouri	249	16.4	716	47.1	330	21.7	163	10.7	62	4.1	1,520
Montana	12	30.0	15	37.5	4	10.0	3	7.5	6	15.0	40
Nebraska	112	9.0	322	26.0	267	21.6	231	18.6	307	24.8	1,239
Nevada	9	26.5	18	52.9	5	14.7	2	5.9	0	0	34
New Hampshire	6	24.0	18	72.0	0	0	0	0	1	4.0	25
New Jersey	34	14.7	148	64.1	42	18.1	5	2.2	2	0.9	231
New Mexico	30	13.8	79	36.4	37	17.0	19	8.8	52	24.0	217
New York	127	17.1	475	63.8	102	13.7	33	4.4	7	1.0	744
North Carolina	117	14.5	356	42.3	282	35.1	49	6.1	0	0	804
North Dakota	142	15.1	420	44.7	249	26.5	93	9.9	36	3.8	940
Ohio	190	15.3	749	60.3	239	19.2	57	4.6	8	0.6	1,243
Oklahoma	69	7.8	413	46.5	233	26.2	101	11.4	72	8.1	888
Oregon	30	11.8	163	63.9	42	16.5	8	3.1	12	4.7	255
Pennsylvania	68	12.1	262	46.7	150	26.7	65	11.6	16	2.9	561
Rhode Island	1	5.0	16	80.0	2	10.0	1	5.0	0	0	20
South Carolina	61	13.6	196	43.3	160	35.4	31	6.8	4	0.9	452
South Dakota	214	28.0	284	37.1	129	16.9	86	11.2	52	6.8	765
Tennessee	30	4.0	345	45.5	258	34.0	101	13.3	24	3.2	758
Texas	141	10.3	505	36.8	373	27.2	209	15.3	143	10.4	1,371
Utah	34	43.0	27	34.2	13	16.5	3	3.8	2	2.5	79
Vermont	15	30.6	32	65.3	2	4.1	0	0	0	0	49
Virginia	83	9.1	435	47.5	329	35.9	62	6.8	7	0.7	916
Washington	142	24.2	293	50.0	95	16.2	28	4.8	28	4.8	586
West Virginia	48	9.7	284	57.2	113	22.8	43	8.7	8	1.6	496
Wisconsin	71	9.1	307	39.5	219	28.2	93	12.0	87	11.2	777
Wyoming	34	24.1	44	31.2	28	19.9	14	9.9	21	14.9	141
Total	3,835	.....	13,783	.....	6,824	.....	2,720	.....	1,635	.....	28,797
Per cent	.....	13.3	.....	47.9	.....	23.7	.....	9.4	.....	5.7	.....

The reporters' remarks are not so readily recapitulated as the schedule records; yet they may be roughly summarized in their physiographic, meteorologic, and historical aspects. In the first place, they bring out certain leading characteristics of particular districts, notably (1) the influence of irrigation on the ground level of water in the Cordilleran States, (2) the prevalence of a well-recognized water horizon—known as "sheet water"—throughout the greater part of the Plains region, and (3) the interdependence of wells, springs, and streams (and hence the essential unity of the subsoil water) in nearly every State. In the second place, a good many remarks bring out the sequential relation between rainfall (or its dearth) and both the level and amount of water in the ground, and while this interdependence is doubtless in some cases overestimated, a general review of the

remarks and records would seem to indicate that a part of the lowering of water level shown in the tables should be ascribed to exceptional droughts; e. g., probably to the extent of a few hundredths of a foot in Minnesota and perhaps a few tenths in eastern Texas and Oklahoma.

The most significant relation brought out by the remarks is the historical one. The tale of about half of the many hundreds quoted is essentially the same: Wells are lowering, springs failing, water growing scarcer from year to year; this iteration comes from two-thirds of the States and half the area of the country, the half that supplies the greater part of our foodstuffs and clothing. Nor can the warning be deemed idle; it comes from perhaps the most substantial class of our people—home-owning citizens of sound judgment, speaking dispassionately from the observation and experience of years. Many of them represent that stage of thought and type of life in which the source of water supply for the home stands as the expression of the home idea—the modern Lars, or home god. And over and over again their words make it clear that they know whereof they speak. Summarized broadly, they tell that the pioneers commonly located their homesteads by springs, of which many failed within a few years; and that the second generation was one of wells, generally dug to moderate depth, carefully walled with stone or brick, and supplied with sweep or windlass—the halcyon time of American growth, of—

> The old oaken bucket, the iron-bound bucket,
> The moss-covered bucket that hung in the well.

They tell, too, of the passing of the household well, of the failure or contamination of the water and the substitution sometimes of the cistern but more frequently of the deep-drilled well with pump operated either by dint of hard labor or by the windmill; and incidentally they tell of the passing of the gurgling trout brook and clear-running mill stream, of the increasing difficulty of getting water for stock, the increasing uncertainty in community supply. Notably a few of the utterances are pessimistic, not many look to continuation of the current trend; most imply a special or temporary reason for the growing dearth of water in exceptionally limited rainfall or other cause; yet the general survey would fail in its function did it not emphasize the general fact of water lowering as of graver consequence to the country as a whole than it can possibly appear to any local observer.

The remarks throw light, too, on certain reasons for the lowering in water level—tile drainage and open ditches in some sections, mining operations in others, clearing and cultivation still oftener; and it is noteworthy that the inferences seem eminently sound and indubitable, the direct outcome of intelligent observation. It is especially significant that the same type of observation correlates lowering of the

subsoil water with the implied increase in storm run-off due to clearing and cultivation in the Appalachian region, and with the rise of subsoil water due to diminished storm run-off attending cultivation in the central Plains region; in both cases the observation is in line with that of the most advanced scientific experts.

Incidentally the remarks bring out various more or less unusual or obscure phenomena connected with wells and springs—the effect of approaching storms or of winds on the water level in wells, "breathing" wells, the appearance of springs during droughts, etc.; all these involve relations between the subsoil water and the materials it permeates, which are of more or less practical consequence to water users, and of which some are treated later.

RECAPITULATION BY REGIONS.

The eight well regions into which mainland United States is conveniently divisible as already indicated are defined primarily by natural conditions (physiography, structure, rainfall, etc.), and secondarily by adequacy of the well data. They are as follows:

(1) New England is essentially a unit in geologic structure, a complex series of ancient indurated rocks generally reduced to an undulating surface rising locally into mountain ranges, the whole smoothed by glacial action and commonly covered by glacial deposits in which most wells and springs find their immediate source. The altitude ranges from near sea level to several thousand feet, generally increasing northward. Wells abound, but the number reported is inadequate for safe determination of the subsoil water level or its movement.

(2) The eastern coast plain may be arbitrarily separated from the southern coast plain at the line formed by Savannah River; it is the lowland bordering the ocean, consisting of Cretaceous and Tertiary formations and overlying Pleistocene deposits, the whole generally inclining seaward. The altitude ranges from near sea level to 250 or 300 feet, the surface like the structure generally rising inland; the rainfall is generally ample for production. Wells are fairly abundant, and the number reported is reasonably adequate for determination of the subsoil water.

(3) The Appalachian region is largely mountainous and generally diversified in surface; its rocks are chiefly Paleozoic, usually inclined or folded, and sometimes metamorphosed; north of northern Pennsylvania the rocks are generally covered with glacial deposits and farther southward with residuary accumulations or alluvial deposits, in which most wells find their supply. The altitude ranges from a few hundred to several thousand feet, and the rainfall is fairly abundant. Wells abound in the districts suited for settlement and cultivation, and the number reported is fairly adequate.

(4) The southern coast plain is the extension of the eastern in configuration, structure, and physical character generally; but it widens

to several hundred miles and its altitudes increase to 300 feet in Georgia and 600 feet in northern Mississippi. By reason of the widening and the heightening this coastwise zone is sometimes quite diversified in surface, as in pinehill Mississippi, though it comprises extended areas of lowlands only a few feet above the level of the sea or adjacent rivers. The mean rainfall is the highest for any of the regions, while wells abound, and the number reported is adequate for fairly dependable determinations.

(5) The interior region is underlain generally by slightly inclined Paleozoic strata, passing into metamorphics and ancient crystallines chiefly in Michigan, the surface generally reduced to a slightly undulating plain partly wooded and partly prairie before settlement; except in its southeastern extension, the rocks are generally overlain by glacial and aqueo-glacial deposits in which wells find their supply; in the southeast these are replaced by residuary and alluvial deposits. The altitude ranges from some 300 to say 2,000 feet; and the rainfall averages about two-thirds that required for full productivity. Almost the entire region is admirably adapted to settlement and production, and may indeed be described as the bread basket and meat hamper of the country; wells abound, and generally the number reported is ample for fair determination of the level and movement of subsoil water under the natural conditions existing throughout the region.

(6) The Ozarkian region may be somewhat arbitrarily set apart from the Interior, chiefly on the ground that it is so related to the Plains in structure and in the movement of its subsoil water that its well data are distinct; physiographically it is a part of the Interior, but hydrographically it is an extension of the Plains.

(7) The Plains in subsurface structure consist chiefly of Cretaceous strata inclining eastward and overlapping Paleozoic formations in eastern Kansas and Oklahoma; above these lie, in the north, glacial and aqueo-glacial deposits and farther southward a great series of deposits that may be broadly considered alluvial, and in these surficial deposits most wells find their immediate supply, though this is maintained in part from underflow from the mountains. The surface generally is uniform, the altitude increasing northward and toward the mountains from near sea level in Texas to three to five thousand feet. Generally the rainfall is meager, though chiefly in the growing season; recent researches indicate that it is eked out and the country rendered much more productive than it would be otherwise through the natural subirrigation due to underflow. Wells are numerous and fairly adequate for determining the level and movement of the water in the ground.

(8) The Cordilleran region comprises a vast area (some two-fifths of mainland United States) of intermont plains and valleys dominated by lofty sierras and peaks, its altitude ranging from considerably

below sea level to over 14,000 feet. Generally the rainfall is meager, though in northwestern Washington it reaches the highest mean for the entire country. Throughout much of the region the water relations are such that wells are incidental rather than essential to habitation; and partly for this reason, partly because the number reported is limited, the well data are inadequate for trustworthy determinations of the water in the ground.

In tabulating the well data by regions, most of the divisions of States in the State summaries are applied. The mean dates and the total number of wells are taken directly from the summaries; and then follow the percentages of bi-state wells in each subdivision. It may be noted that these percentages afford a useful indication of the general trustworthiness of the data; for it is manifest that if all reporters were ideally informed, perfectly intelligent, and thoroughly scrupulous the percentage column would be a series of 100s instead of figures ranging from less than 50 to a maximum of 85, and averaging 70.7. Of course, the figures measure inevitable limitations, and, other things equal, are lower for the older States, and higher for the newer States and shorter periods of observation.

The aggregate numbers of bi-state wells are also taken directly from the summaries, and the numbers of unchanged wells are tabulated by subtraction; and then follow the percentages of bi-state wells changed. This column affords a rough indication of the change of water level within each division and region; for regions it is least in the Plains and next in the Ozarkian region; for States adequately represented by wells it is least (only 22.3 per cent) in Nebraska and most (83.7 per cent) in western Maryland.

The wells in which the water level is recorded as risen are taken directly from the summaries and the mean amount of rise for each State or division and region is reckoned. The aggregate number of such wells is limited—only 1,401 in all, or less than 7 per cent of the bi-state wells. It should be noted that while, other things equal, the tendency of water is to rise in wells with continued use (through the gradual enlargement of the interstices delivering the water), this column is probably the least dependable in the tabulated recapitulation by regions, for a relatively large proportion of the entries in the schedules suggest either misunderstanding or some abnormal condition, such as the deepening or in some cases "shooting" of the well without definite record. Nevertheless, the figures are fairly consonant with those in other columns—e. g., in the Plains region the numbers of risen wells and the amounts of rise supplement quite fairly the numbers of lowered wells and the amounts of lowering in each State and in the region as a whole.

The numbers of wells lowered are also taken and the amounts of lowering reckoned from the summaries, and partly because of the relatively large numbers involved (nearly 40 per cent of the bi-state

wells showing a fall in the water level) these columns seem exceptionally dependable. In a general way the number of wells lowered and the amount of lowering are strikingly consonant not only for each State, but throughout each region, though this relation is sometimes masked by others—e. g., in the Interior, where the ratio of wells lowered is high, the amount of lowering is somewhat less than in the Plains where the ratio of wells lowered is less, though a large proportion of them are drilled and comparatively new.

In reckoning the average change of water in wells the sums of wells risen and lowered in each division or State are tabulated, together with the means obtained through dividing the aggregate lowering less the aggregate rise by these sums, as in the recapitulation by States (pp. 161–163). Then follows the mean minimum change (generally lowering) per decade, also taken from the recapitulation by States. Now, inspection of the schedules in connection with the State summaries indicates that these means are too low, for several reasons. In the first place it is clear (1) that a good many wells have been deepened without record, (2) that a good many in each county have been abandoned without record, and (3) that in quite a number of instances (chiefly wells supplied with pumps) the present depth of water is either not given or inferred to be unchanged, though presumptively lowered; and in the second place many of the wells reported are undoubtedly so located (in ravines or draws or on river bottoms) as not to show the change normal to their respective counties. Accordingly, in the tabular recapitulation by regions (pp. 171–173) the maximum average change is introduced, reckoned from the sum of wells actually changed and the total mean change (using the former as divisor and the latter as dividend). This yields a series of accurate figures for the wells changed, but the method is open to the objection that in ignoring the bi-state wells not changed the figures are misleading for those States and divisions in which many or most of the bi-state wells show no change, although probably sometimes so placed as to do so had an appreciable alteration in level occurred. The excess of the maximum over the minimum of lowering varies, of course, with the ratio of changed wells to the total number of bi-state character. In New England the average excess is only about 50 per cent, in the Eastern coast plain it is a trifle over 100 per cent, in the Appalachian region it is less and in the Southern coast plain more than 100 per cent, in the extensive Interior region it is a trifle below 100 per cent, and in the Ozarkian, Plains, and Cordilleran regions the maximum is between two and three times the minimum mean. The figures for well lowering are worthy of serious consideration. In some respects they form the most significant results of the well census. Their bearing on practical problems of water supply and of continued habitability in our food-producing States is strong and direct, and it

seems in the highest degree desirable that the figures and the methods used in obtaining them should be guarded by all practicable precautions. It is manifest, in the light of the schedules, that the rate of lowering obtained by using all the bi-state wells as divisor is too low, and it is equally manifest that the rate obtained by omitting all the unchanged bi-state wells is too high; and after trial of various methods yielding intermediate results in different States and regions it was finally decided to take the arithmetic mean between the minimum and maximum rates as affording the fairest measure of lowering. Accordingly, a third column is added giving these means, and these are adopted in later tabulations and discussions as representing the average lowering in subsoil water level by States or divisions and by regions.

It is chiefly in the light of the average change in wells that the well regions are defined; for while a few discrepancies occur (e. g., the lowering in northern New Jersey is less than in southern), in most cases the figures are fairly conformable throughout each region and more or less widely diverse as between regions, especially as between the Eastern coast plain and the adjacent Appalachian region, as between the latter and the Interior, and as between both these and the Ozarkian region. In the Plains the range in lowering is nearly as wide as in the rest of the country, and the mean is second only to that of the Interior—this in conformity with wide variability in local conditions coupled with excessive draft on artesian wells, especially in Texas and South Dakota.

In the remaining columns the water-table figures for the States and divisions are given, the two classes of wells in each being combined, and it will be noted that there is a satisfying consonance between (1) the water-table depths, (2) the mean lowering of water, (3) the ratio of wells risen to wells lowered, and (4) the ratio of wells changed to the total number of bi-state wells. Excluding New England and the Cordilleran region, the highest mean water table is in the Eastern coast plain, where also the lowering is slowest; the lowest is in the Plains, where the lowering is next to the highest; and the nearest approach to the mean is in the vast Interior and Appalachian regions, in which the ratio of wells changed is highest.

The accompanying résumé by regions (p. 174) brings out some of the foregoing features and still others. The percentage of bi-state wells changed ranges from 25.7 in the Plains to 42.6 in the Appalachian region, and averages 33; while the ratio of wells risen to wells lowered ranges from 1 per cent in New England and 6.6 per cent in the Interior to 46.5 per cent in the Ozarkian region and 51.4 per cent in the Cordilleran region, averaging 17.2 per cent; in other words, the ratio of wells risen affords a fair index to the amount of change and also to the depth of the water table.

Recapitulation by regions.

1. NEW ENGLAND.

State	Mean date.	Total wells.	Per cent bi-state.	Aggregate.	Unchanged.	Per cent changed.	Bi-state wells. Rise. No.	Rise. Mean.	Fall. No.	Fall. Mean.	Average change per decade. Gross. No.	Gross. Mean.	Minimum.	Maximum.	Mean.	Water table. No.	Water table. Mean.
Connecticut	1831.1	43	65.1	28	9	67.9	0	0	19	2.92	19	2.92	0.251	0.370	0.311	43	19.7
Maine	1877.4	51	76.5	39	15	61.5	0	0	24	2.44	24	2.44	.460	.748	.604	51	15.5
Massachusetts	1855.2	62	61.3	38	19	50.0	1	0.50	18	4.00	19	3.76	.343	.687	.515	62	22.7
New Hampshire	1847.4	25	76.0	19	4	78.9	0	0	15	5.20	15	5.20	.656	.831	.743	25	18.9
Rhode Island	1830.8	20	85.0	17	9	47.1	0	0	8	4.81	8	4.81	.286	.608	.447	20	21.1
Vermont	1850.2	49	49.0	24	9	62.5	0	0	15	5.07	15	5.07	.530	.847	.688	49	12.9
Total	1852.7	250	66.0	165	65	60.6	1	0.50	99	3.82	100	3.78	0.400	0.660	0.530	250	18.2

2. EASTERN COAST PLAIN.

State	Mean date.	Total wells.	Per cent bi-state.	Aggregate.	Unchanged.	Per cent changed.	Rise. No.	Rise. Mean.	Fall. No.	Fall. Mean.	Gross. No.	Gross. Mean.	Minimum.	Maximum.	Mean.	Water table. No.	Water table. Mean.
Delaware	1882.3	84	52.4	44	24	45.5	0	0	20	2.50	20	2.50	0.401	0.903	0.652	84	20.7
Maryland (eastern)	1885.9	71	54.9	39	28	28.2	0	0	11	2.05	11	2.05	.239	.849	.544	71	19.7
New Jersey (southern)	1866.6	116	59.5	69	31	55.1	0	0	38	5.08	38	5.08	.649	1.170	.910	116	22.8
New York (Long Island)	1870.0	49	79.6	39	20	48.7	0	0	19	3.24	19	3.24	.394	.809	.602	49	39.4
North Carolina (eastern)	1884.8	225	53.8	121	66	45.5	19	1.87	36	2.51	55	1.00	.179	.397	.288	225	13.0
South Carolina (coastal)	1883.4	209	61.7	129	62	51.9	12	1.33	55	2.85	67	2.10	.411	.791	.601	207	19.3
Virginia (tidewater)	1877.5	209	69.4	145	81	44.1	11	2.36	53	1.85	64	1.12	.153	.346	.250	209	19.1
Total	1879.2	963	60.9	586	312	46.6	42	1.85	232	2.86	274	2.14	0.324	0.693	0.514	961	19.4

3. APPALACHIAN.

State	Mean date.	Total wells.	Per cent bi-state.	Aggregate.	Unchanged.	Per cent changed.	Rise. No.	Rise. Mean.	Fall. No.	Fall. Mean.	Gross. No.	Gross. Mean.	Minimum.	Maximum.	Mean.	Water table. No.	Water table. Mean.
Alabama (northeastern)	1885.7	218	75.7	165	72	56.4	8	2.75	85	3.76	93	3.20	0.742	1.316	1.030	218	33.8
Georgia (upland)	1880.5	474	78.9	374	140	62.6	15	1.47	219	2.69	234	2.42	.513	.820	.666	474	37.2
Kentucky (eastern)	1886.9	118	74.6	88	27	69.3	14	2.57	47	4.11	61	2.57	.772	1.114	.943	118	18.4
Maryland (western)	1871.1	106	81.1	86	14	83.7	2	1.00	70	6.07	72	5.87	1.264	1.510	1.387	105	41.3
New Jersey (northern)	1864.8	116	68.1	79	29	63.3	3	2.00	47	4.62	50	4.22	.591	.934	.762	115	24.1
New York	1867.9	695	70.8	492	188	61.8	5	4.80	299	5.11	304	4.98	.725	1.182	.977	695	21.6
North Carolina (western)	1886.2	581	72.6	422	188	55.5	12	1.29	222	2.66	234	2.47	.571	1.036	.803	579	34.9

Recapitulation by regions—Continued.

3. APPALACHIAN—Continued.

State.	Mean date.	Total wells.	Per cent bi-state.	Aggregate.	Unchanged.	Per cent changed.	Bi-state wells. Rise. No.	Rise. Mean.	Fall. No.	Fall. Mean.	Average change per decade. Gross. No.	Gross. Mean.	Minimum.	Maximum.	Mean.	Water table. No.	Water table. Mean.
Pennsylvania	1874.9	561	65.8	369	112	69.6	7	6.43	250	6.25	257	5.91	1.171	1.864	1.427	561	34.3
South Carolina (Piedmont)	1884.2	245	78.4	192	82	57.3	14	1.68	96	3.26	110	2.68	.584	1.039	.811	245	40.6
Tennessee (eastern)	1892.9	264	71.6	189	89	52.9	7	3.29	93	4.62	100	4.06	1.258	2.377	1.817	264	34.2
Virginia (Piedmont)	1882.5	707	72.8	515	261	49.3	21	1.69	233	3.66	254	3.22	.578	1.171	.874	707	35.3
West Virginia	1881.3	497	64.0	318	134	57.9	18	2.78	166	4.91	184	4.16	.839	1.450	1.144	496	29.9
Total	1879.7	4,582	71.8	3,289	1,336	59.4	126	2.42	1,827	4.29	1,953	3.86	0.756	1.273	1.015	4,577	32.2

4. SOUTHERN COAST PLAIN.

State.	Mean date.	Total wells.	Per cent bi-state.	Aggregate.	Unchanged.	Per cent changed.	Bi-state wells. Rise. No.	Rise. Mean.	Fall. No.	Fall. Mean.	Average change per decade. Gross. No.	Gross. Mean.	Minimum.	Maximum.	Mean.	Water table. No.	Water table. Mean.
Alabama (southern)	1890.6	267	68.2	182	96	47.3	17	1.53	69	2.93	86	2.05	0.498	1.055	0.776	267	31.4
Arkansas (southeastern)	1894.0	393	63.4	249	152	39.0	23	1.72	74	3.28	97	2.10	.511	1.311	.911	393	27.2
Florida	1896.3	345	52.2	180	80	55.6	47	2.40	53	4.06	100	1.02	.414	.745	.579	345	18.7
Georgia (lowland)	1888.7	349	65.3	228	79	65.4	31	2.24	118	4.27	149	2.92	.895	1.369	1.132	349	31.7
Kentucky (Jackson purchase)	1881.4	40	72.5	29	21	27.6	0	0	8	2.69	8	2.69	.259	.940	.599	40	46.6
Louisiana	1894.1	408	61.5	251	139	44.6	16	1.78	96	3.86	112	3.05	.857	1.921	1.389	408	22.9
Mississippi	1888.3	821	67.8	557	390	30.0	14	1.79	153	3.92	167	3.45	.476	1.588	1.032	815	37.3
Missouri (lowland)	1896.6	73	42.5	31	23	25.8	0	0	8	4.19	8	4.19	.806	3.125	1.965	73	20.6
Tennessee (western)	1892.8	234	49.6	116	60	48.3	1	1.00	55	3.47	56	3.39	.952	3.393	2.172	234	46.2
Total	1891.6	2,930	62.2	1,823	1,040	43.0	149	2.03	634	3.76	783	2.65	.620	1.443	1.031	2,924	31.0

5. INTERIOR.

State.	Mean date.	Total wells.	Per cent bi-state.	Aggregate.	Unchanged.	Per cent changed.	Bi-state wells. Rise. No.	Rise. Mean.	Fall. No.	Fall. Mean.	Average change per decade. Gross. No.	Gross. Mean.	Minimum.	Maximum.	Mean.	Water table. No.	Water table. Mean.
Alabama (northwestern)	1888.8	113	72.6	82	39	52.4	10	1.60	33	3.82	43	2.56	0.633	1.207	0.920	113	27.7
Illinois	1883.6	1,224	75.6	925	426	53.9	54	2.36	445	6.10	499	5.18	1.058	1.962	1.510	1,224	25.6
Indiana	1887.3	939	70.0	657	291	55.7	26	1.90	340	5.73	366	5.18	1.272	2.283	1.777	939	26.7
Iowa	1887.0	1,527	76.0	1,160	632	45.5	27	5.41	501	8.65	528	7.93	1.570	3.449	2.509	1,502	46.1
Kentucky (bluegrass)	1887.9	647	73.9	478	206	56.9	40	3.29	232	4.84	272	3.65	.919	1.649	1.284	647	30.4

Michigan	1890.7	1,074	73.9	794	481	39.2	15	1.57	298	5.49	313	5.16	1.053	2.672	1.862	1,053	32.9
Minnesota	1895.8	1,169	78.1	913	397	56.5	26	4.02	490	6.88	516	6.33	2.521	4.460	3.490	1,146	44.6
Ohio	1879.8	1,243	73.0	908	425	53.2	10	2.70	473	4.98	483	4.53	.798	1.501	1.149	1,243	24.8
Tennessee (middle)	1888.9	260	70.0	182	86	52.7	2	1.50	94	3.76	96	3.65	.911	1.728	1.319	260	37.6
Wisconsin	1891.4	779	79.6	620	234	62.3	7	2.29	379	6.38	386	6.22	2.083	3.346	2.715	777	49.5
Total	1887.9	8,975	74.9	6,719	3,217	52.1	217	2.92	3,285	6.30	3,502	5.72	1.350	2.590	1.970	8,904	35.4

6. OZARKIAN.

Arkansas (northwestern)	1891.7	604	72.7	439	246	44.0	46	2.14	147	4.10	193	2.61	0.628	1.428	1.028	604	27.0
Missouri (upland)	1888.1	1,454	69.9	1,017	687	32.4	120	3.64	210	6.67	330	2.92	.433	1.335	.884	1,447	34.3
Total	1889.3	2,058	70.7	1,456	933	35.9	166	3.22	357	5.61	523	2.81	.485	1.350	.917	2,051	32.1

7. PLAINS.

Colorado (plains)	1903.4	285	68.8	196	155	20.9	20	3.95	21	11.40	41	3.91	1.241	5.931	3.586	285	71.0
Kansas	1889.3	1,317	77.4	1,020	712	30.0	142	6.00	166	5.02	308	− .06	− .008	− .027	− .018	1,317	43.5
Nebraska	1894.6	1,239	66.6	825	641	22.3	72	5.42	112	3.87	184	.24	.034	1.535	.784	1,239	72.5
North Dakota	1901.3	940	83.9	789	444	43.7	45	3.89	300	5.26	345	4.07	2.044	4.663	3.253	940	33.9
Oklahoma	1901.1	888	79.6	697	363	47.9	94	8.86	240	6.81	334	2.40	1.290	2.700	1.995	888	42.4
South Dakota	1898.2	766	75.8	581	367	36.8	39	4.09	175	6.70	214	4.77	1.488	4.039	2.763	765	33.5
Texas	1894.8	1,386	66.6	923	597	35.3	66	5.66	260	9.43	326	6.37	1.481	4.192	2.836	1,371	50.4
Total	1896.2	6,821	73.8	5,031	3,279	34.8	478	5.99	1,274	6.56	1,752	3.14	0.792	2.274	1.533	6,805	48.8

8. CORDILLERAN.

Arizona	1902.3	44	90.9	40	24	40.0	9	6.40	7	2.43	16	−2.53	−1.315	−3.287	−2.301	44	43.2
California	1892.0	491	74.3	365	226	38.1	31	5.44	108	7.27	139	4.44	.938	2.464	1.701	489	36.6
Colorado (mountain)	1896.4	129	76.0	98	60	38.8	24	10.85	14	1.39	38	−3.71	−1.058	−4.663	−2.860	129	24.3
Idaho	1901.7	311	79.1	246	126	48.8	66	7.92	54	3.84	120	−2.63	−1.545	−3.168	−2.356	311	52.1
Montana	1897.1	40	60.0	24	18	25.0	3	2.00	3	1.00	6	− .50	− .096	− .388	− .242	40	44.0
Nevada	1902.1	34	47.1	16	6	62.5	5	5.30	5	3.50	10	− .80	− .712	−1.013	− .862	34	22.6
New Mexico	1904.3	217	70.0	152	101	33.6	19	10.18	32	7.47	51	.89	.525	1.565	1.045	217	62.1
Oregon	1891.3	255	77.3	197	105	46.7	15	11.30	77	4.78	92	2.16	.539	1.212	.875	255	32.6
Utah	1896.5	79	72.2	57	23	59.6	21	8.05	13	4.73	34	−3.16	−1.397	−2.342	−1.869	79	23.4
Washington	1899.5	586	46.8	274	150	45.3	19	5.29	105	4.64	124	3.12	1.345	2.792	2.158	586	34.1
Wyoming	1904.6	141	79.4	112	88	21.4	10	3.95	14	4.11	24	.75	.298	1.389	.843	141	48.7
Total	1897.8	2,327	67.9	1,581	927	41.4	222	7.74	432	5.24	654	.84	.285	.841	.563	2,325	39.7
Aggregate	1889.3	28,906	70.7	20,650	11,109	46.2	1,401	4.60	8,140	5.48	9,541	4.00	0.892	1.931	1.411	28,797	37.0

Résumé by regions.

Region.	Mean date.	Total wells.	Wells changed.		Risen.		Change.			Water table.	
			No.	Per cent.	No.	Per cent.	Lowered.	Mean lowering.		No.	Mean.
								Absolute.	Per decade.		
1. New England	1852.7	250	100	40.0	1	1.0	99	3.78	0.530	250	18.2
2. Eastern coast plain	1879.2	963	274	28.5	42	18.1	232	2.14	.514	961	19.4
3. Appalachian	1879.7	4,582	1,953	42.6	126	6.9	1,827	3.86	1.015	4,577	32.2
4. Southern coast plain	1891.6	2,930	783	26.7	149	23.5	634	2.65	1.031	2,924	31.0
5. Interior	1887.9	8,975	3,502	39.2	217	6.6	3,285	5.72	1.970	8,904	35.4
6. Ozarkian	1889.3	2,058	523	25.4	166	46.5	357	2.81	.917	2,051	32.1
7. Plains	1896.2	6,821	1,752	25.7	478	37.5	1,274	3.14	1.533	6,805	48.8
8. Cordilleran	1897.8	2,327	654	28.1	222	51.4	432	.84	.563	2,325	39.7
Aggregate	1889.3	28,906	9,541	33.0	1,401	17.2	8,140	4.00	1.411	28,797	37.0

RÉSUMÉ BY TYPICAL STATES.

As the data for States and regions were assembled it became clearer than at the outset that the regions are even more widely unlike in dependability of their figures as to the lowering of the water level than as to the depth of this level below the surface; accordingly, the data for typical States were brought together with special reference to the rate of lowering. So arranged, it appears that in none of the States in New England or the Cordilleran region (except Rhode Island, where the wells are few) is the index for dependability for water level so much as 3, while in all the 31 States of the remaining regions the index is 3, 4, or 5. Accordingly, a rough dependability scale was worked out in the manner pursued in connection with the water level, except the basis was the number of bi-state wells in lieu of the total wells in each State. This reduced by one point the dependability index in about half of the States, when somewhat arbitrarily the index numbers for the remaining States were similarly reduced by one point each. These values are shown in the accompanying table (p. 175), in which other relations are also brought out.

Résumé by typical States.

State.	Dependability index.	Date.	Total wells.	Bi-state wells.		Wells risen.		Wells lowered.	Mean lowering.				Square miles per bi-state well.	Dependability index.
				No.	Per cent.	No.	Per cent.		Absolute.	Minimum per decade.	Maximum per decade.	Average.		
Ala	3	1888.4	598	429	71.7	35	18.7	187	2.63	0.630	1.217	0.928	119.5	2
Ark	3	1892.5	997	688	69.0	69	31.2	221	2.44	.588	1.395	.991	80.1	2
Del	5	1882.3	84	44	52.4	0	0.0	20	2.50	.401	.904	.652	44.7	3
Fla	3	1896.3	345	180	52.2	47	88.7	53	1.02	.414	.745	.579	304.8	2
Ga	3	1883.5	823	602	73.1	46	13.6	337	2.61	.621	.986	.803	97.5	2
Ill	5	1883.6	1,224	925	75.6	54	12.1	445	5.18	1.058	1.962	1.510	60.5	4
Ind	5	1887.3	939	657	70.0	26	7.6	340	5.18	1.272	2.283	1.777	54.6	4
Iowa	5	1887.0	1,527	1,160	76.0	27	5.4	501	7.93	1.570	3.449	2.509	47.9	4
Kans	4	1889.3	1,317	1,020	77.4	142	85.5	166	−.06	−.008	−.027	−.018	70.5	4
Ky	4	1887.4	805	595	73.9	54	18.8	287	3.43	.870	1.508	1.189	67.5	3
La	3	1894.1	408	251	61.5	16	16.7	96	3.05	.857	1.921	1.389	180.9	2
Md	3	1875.2	177	125	70.6	2	2.4	81	5.37	1.024	1.542	1.283	79.5	2
Mich	4	1890.7	1,074	794	73.9	15	5.0	298	5.16	1.053	2.672	1.862	72.4	4
Minn	4	1895.8	1,169	913	78.1	26	5.3	490	6.33	2.521	4.460	3.490	88.6	4
Miss	3	1888.3	821	557	67.8	14	9.2	153	3.45	.476	1.588	1.032	83.2	2
Mo	4	1888.4	1,527	1,048	68.6	120	55.0	218	2.95	.441	1.367	.904	65.6	3
Nebr	4	1894.6	1,239	825	66.6	72	64.3	112	.24	.034	1.535	.784	91.9	4
N. J	4	1865.7	232	148	63.8	3	3.5	85	4.59	.616	1.039	.827	50.8	2
N. Y	3	1868.1	744	531	71.4	5	1.6	318	4.85	.703	1.156	.930	89.7	2
N. C	3	1885.9	806	543	67.4	31	12.0	258	2.18	.480	.903	.691	89.8	2
N. Dak	4	1901.3	940	789	83.9	45	15.0	300	4.07	2.044	4.663	3.253	90.0	3
Ohio	4	1879.8	1,243	908	73.0	10	2.1	473	4.53	.798	1.501	1.149	44.9	4
Okla	4	1901.1	888	697	79.6	94	39.2	240	2.40	1.290	2.700	1.995	99.6	3
Pa	3	1874.9	581	422	65.8	7	2.8	250	5.91	1.171	1.864	1.427	106.2	2
S. C	3	1883.9	454	321	72.9	26	17.2	151	2.43	.510	.931	.720	95.0	2
S. Dak	4	1898.2	766	581	75.8	39	22.3	175	4.77	1.488	4.039	2.763	132.3	3
Tenn	3	1891.5	758	487	64.2	10	4.1	242	3.76	1.051	2.030	1.540	85.6	2
Tex	3	1894.8	1,386	923	66.6	66	25.4	260	6.37	1.481	4.192	2.836	284.3	2
Va	4	1881.4	916	660	72.1	32	11.2	286	2.80	.472	.979	.725	61.0	2
W.Va	4	1881.3	497	318	64.0	18	10.8	166	4.16	.839	1.450	1.144	75.5	2
Wis	4	1891.4	779	620	79.6	7	1.8	379	6.22	2.083	3.346	2.715	89.1	4
Total	....	1890	26,064	18,761	72.0	1,158	15.3	7,588	4.24	0.989	1.855	1.422	.....	....

It will be noted that of the 28,906 wells tabulated, 26,064 (90.2 per cent) occur in these typical States; i. e., the number is large enough (ranging from 84 in Delaware and 177 in Maryland to 1,527 each in Iowa and Missouri) to inspire a reasonable confidence in the figures. Of the total wells 18,761 (72 per cent) are bi-state, and of these, 7,588 (or 40.5 per cent) show lowering of the water level, while 1,158 (15.2 per cent of those lowered) show a rise in water level. Conformably with the relation brought out in the recapitulation by regions, the lowering in these typical States is somewhat more pronounced than in the country at large, whether measured by ratio of wells lowered or by the amount of lowering.

In order to accommodate users of the table whose predilections may favor either the minimum, maximum, or mean rates of lowering the three are introduced for each State, and in the footings it will be observed that in these States only one (Kansas) shows a mean rise in the water level and that of almost infinitesimal amount. In the other States the mean lowering ranges from 0.579 foot per decade in Florida to 3.490 feet per decade in Minnesota. The average for the 31 States (assuming the mean period to be 1890–1910) is 1.422 feet per decade.

REVIEW BY TYPICAL STATES.

While the foregoing tables bring out the essential facts with respect to lowering in the subsoil water level, they do not emphasize these facts either in the practical or the scientific aspect. Accordingly, the same figures with some others showing their relations are incorporated in the accompanying table (p. 178), in which the States from Minnesota to Kansas are arranged in the order of lowering of subsoil water in their wells. In this table mean dates are given in full years, and the actual lowering for the term covered by the records is given only to the tenth of a foot. Then, in order to indicate the practical bearing of the change, the period since settlement in each State is roughly estimated in full decades, and the gross lowering for that period is reckoned and expressed in feet and tenths. The gravity of the condition brought out by the well census appears from the figures in this column—figures which must be regarded as conservative. Excluding Kansas, the total lowering since settlement as thus reckoned ranges from 2.3 feet in Florida and 3.1 in Nebraska to 17.1 in Pennsylvania, where the subsidence of the water is presumably in part due to mining and other industrial operations; yet it is 16.3 feet in Wisconsin, 14 feet or over in Indiana, Maryland, and Minnesota, and over 10 feet in 14 out of the 31 typical States.

In order to bring out more fully the relations of the lowering water level, additional columns are introduced; the first of these shows the present mean water table for the State taken from earlier tables, together with the original water table computed by subtracting the gross amount of lowering, and it will be observed that there is no incongruity in the figures—indeed the gross lowering of the preceding column added to the present water table would not generally raise the original water table to the level it must have held when settlement began, judging both from the schedule records and from common knowledge. Partly for this reason, the final column is added giving the present water table of the wells of class *a* (i. e., dug wells) and the difference left by subtracting the amount of gross lowering—and generally the figures when so tested show a satisfactory consonance with the known well history of each State. It is true that in Indiana the method gives less than 4 feet as the original depth, which is manifestly too small despite the great area of the Kankakee and other swamps in which the pristine water level approached the surface; but in other States there is hardly an incongruity. In Minnesota the derived original depth (9.5 feet) comports closely with the records of early wells for much of the State, with the remarks of many reporters, and with general knowledge of the Millelacs country in which glacial lakes and sloughs raised the standing water level very nearly to that of the mean land surface. In Illinois, too, the

derived original water table at 8.3 feet is well sustained by the records and remarks for much of the State no less than by the condition originally giving the Commonwealth its colloquial designation (the "Sucker State"); i. e., the occurrence of subsoil water so near the surface of the far-stretching champaigns as to be reachable through crayfish burrows. In Pennsylvania the derived original depth (7.1 feet) would appear somewhat too low unless large account be taken of the fact that the original homesteads of this State were almost invariably located by springs; and in New York and Ohio, too, the derived depths of 7.3 and 8.7 feet seem a trifle low. On the other hand, the derived depths of 10.1 feet in Wisconsin, 11.6 feet in Iowa, 10.9 feet in Michigan, 11.6 feet in Kentucky, 12.1 feet in West Virginia, 11.7 feet in New Jersey, and 11.8 feet in Delaware conform strikingly to the records and to general knowledge concerning these States. In a few cases the derived depth of the water table seems excessive, as in Alabama, Arkansas, Florida, Georgia, Maryland, Missouri, North Carolina, South Carolina, and Virginia, in which it ranges from 14.6 feet to 25.7 feet; while in the newly-settled Plains States in which the pioneer and well driller often joined forces the figures are of less significance. Still, taken on the whole, the derived original depths of water table for a majority of the 31 typical States comports so well with the records and with general knowledge as to inspire much confidence in the figures for gross lowering of the water level in the several States during the period since settlement.

Arranged in the order of amount of gross lowering, the 31 typical States with their area, the estimated period since settlement, and the amount of lowering are as follows:

State.	Area.	Period.	Lowering.	State.	Area.	Period.	Lowering.
	Sq. miles.	*Years.*	*Feet.*		*Sq. miles.*	*Years.*	*Feet.*
1. Pennsylvania	44,832	120	17.1	17. Virginia	40,262	120	8.7
2. Wisconsin	55,256	60	16.3	18. Louisiana	45,409	60	8.3
3. Indiana	35,885	80	14.2	19. South Dakota	76,868	30	8.3
4. Maryland	9,941	110	14.0	20. Georgia	58,725	100	8.0
5. Minnesota	80,858	40	14.0	21. South Carolina	30,495	110	7.9
6. Iowa	55,586	50	12.5	22. Delaware	1,965	120	7.8
7. Tennessee	41,687	80	12.3	23. Alabama	51,279	80	7.4
8. Ohio	40,740	100	11.5	24. Mississippi	46,362	70	7.2
9. Texas	262,398	40	11.3	25. North Carolina	48,740	100	6.9
10. Michigan	57,480	60	11.2	26. Arkansas	52,525	50	5.0
11. New York	47,654	120	11.2	27. Missouri	68,727	50	4.5
12. Kentucky	40,181	90	10.7	28. Oklahoma	69,414	20	4.0
13. Illinois	56,002	70	10.6	29. Nebraska	76,808	40	3.1
14. West Virginia	24,022	90	10.3	30. Florida	54,861	40	2.3
15. New Jersey	7,514	120	9.9	31. Kansas	81,774	40	− .1
16. North Dakota	70,183	30	9.8				

Collectively, the 31 typical States comprise 1,734,433 square miles, or considerably above half the area of mainland United States; throughout them, as indicated by the figures, the water table has been lowering at the mean rate of 1.130 feet per decade; if the aver-

age period since settlement be 80 years, this is equivalent to a mean lowering of a little over 9 feet throughout the 31 States. Assuming that the interstitial water forms 25 per cent of the volume of saturated subsoil, this is equivalent to an actual loss of water of 2.25 feet in depth; and assuming that the original reservoir of subsoil water constituting the agricultural reserve capital of the country averaged 25 feet within the first hundred feet of the surface (and of course chiefly within the lower three-quarters of this depth), the loss is equivalent to some 10 per cent of the original store.

Review by typical States.

State.	Date.	Wells.	Mean lowering.		Gross lowering.		Present water table.	Original water table.	For *a* wells.	
			Per decade.	For term.	Years since settlement.	Amount.			Present water table.	Original water table.
1. Minnesota	1896	1,169	3.490	4.9	40	14.0	44.6	30.6	23.5	9.5
2. North Dakota	1901	940	3.253	2.9	30	9.8	33.9	24.1	24.4	14.6
3. Texas	1895	1,386	2.836	4.3	40	11.3	50.4	39.1	27.8	16.5
4. South Dakota	1898	766	2.763	3.3	30	8.3	33.5	25.2	26.4	18.1
5. Wisconsin	1891	779	2.715	5.2	60	16.3	49.5	33.2	26.4	10.1
6. Iowa	1887	1,527	2.509	5.8	50	12.5	46.1	33.6	24.1	11.6
7. Oklahoma	1901	888	1.995	1.8	20	4.0	42.4	38.4	23.4	19.4
8. Michigan	1891	1,074	1.862	3.5	60	11.2	32.9	21.7	22.1	10.9
9. Indiana	1887	939	1.777	4.1	80	14.2	26.7	12.5	17.9	3.7
10. Tennessee	1891	758	1.540	2.9	80	12.3	39.0	26.7	29.7	17.4
11. Illinois	1884	1,224	1.510	3.9	70	10.6	25.6	15.0	18.9	8.3
12. Pennsylvania	1875	581	1.427	5.0	120	17.1	34.3	17.2	24.1	7.1
13. Louisiana	1894	408	1.389	2.2	60	8.3	22.9	14.6	21.5	13.2
14. Maryland	1875	177	1.283	4.5	110	14.0	32.6	18.6	28.6	14.6
15. Kentucky	1887	805	1.189	2.7	90	10.7	29.4	18.7	22.3	11.6
16. Ohio	1880	1,243	1.149	3.4	100	11.5	24.8	13.8	19.2	8.7
17. West Virginia	1881	497	1.144	3.3	90	10.3	29.9	19.6	22.4	12.1
18. Mississippi	1888	821	1.032	2.3	70	7.2	37.3	30.1	32.6	25.4
19. Arkansas	1892	997	.991	1.8	50	5.0	27.0	22.0	22.7	17.7
20. New York	1868	744	.930	3.9	120	11.2	22.8	11.6	18.5	7.3
21. Alabama	1888	598	.928	2.0	80	7.4	31.6	24.2	29.9	22.5
22. Missouri	1888	1,527	.904	2.0	50	4.5	33.6	29.1	21.2	16.7
23. New Jersey	1866	232	.827	3.6	120	9.9	23.4	13.5	21.6	11.7
24. Georgia	1883	823	.803	2.2	100	8.0	34.9	26.9	33.7	25.7
25. Nebraska	1895	1,239	.784	1.2	40	3.1	72.5	69.4	29.2	26.1
26. Virginia	1881	916	.725	2.1	120	8.7	31.6	22.9	29.4	20.7
27. South Carolina	1884	454	.720	1.9	110	7.9	31.0	23.1	30.9	23.0
28. North Carolina	1886	806	.691	1.7	100	6.9	28.8	21.9	28.4	21.5
29. Delaware	1882	84	.652	1.8	120	7.8	20.7	12.9	19.6	11.8
30. Florida	1896	345	.579	.8	40	2.3	18.7	16.4	18.1	15.8
31. Kansas	1889	1,317	−.018	.....	40	−.1	43.5	43.6	22.7	22.8

REVIEW OF THE WELL CENSUS.

THE GENERAL RESULTS.

The primary outcome of the well inquiry is a large body of data indicating the subsoil-water level in every State and 90 per cent of the counties of mainland United States. The depth of the water level beneath the surface varies from place to place, but is in over 60 per cent of the wells, and in most States on the average for all wells, within capillary reach of the surface soil. The subsoil water may be deemed the agricultural reserve capital of the country, since on it productivity depends; it is the store sustaining seasonal growth and assuring pro-

tection against drought; and the well data bring out the fact that its upper level is not far from the limit of its availability for crop growth.

Second in order but first in significance among the results of the inquiry is a clear quantitative indication that the subsoil-water level is, and has been since the settlement of the country, lowering at a considerable rate. The rate of change varies from region to region and State to State, ranging from a slight rise in irrigated districts to a lowering of about 3.5 feet per decade. In the 31 States forming the half of the country best adapted by natural conditions to feeding and clothing a great people the average lowering since settlement would appear to be no less than 9 feet, i. e., from well within to about the limit of capillary reach from the surface. The data indeed indicate that lowering generally was more rapid within the first generation after settlement than later, yet the figures used in the estimates are derived from the reduced rate of the last two decades rather than the more rapid lowering of earlier decades. It would appear also that the actual loss of water attending the lowering is 10 per cent of the aggregate volume within the first hundred feet from the surface—a national loss of substance comparable with the destruction of forests and the uses and wastes of petroleum and natural gas, and far exceeding the consumption and waste of coal and metal. In the light of the relation of subsoil water to productivity, its rate of lowering can only be regarded as a measure of advancing national impoverishment.

An incidental result of the well inquiry is a useful body of observation and opinion on the relations between the subsoil-water level and current industrial conditions. The observations bring out certain causes of lowering in the subsoil-water level and certain local benefits resulting therefrom, especially in regions improved agriculturally through drainage. In conjunction with other researches, the data afford a basis for considering the causes and prescribing means for prevention of the lowering in subsoil water.

A final result of the inquiry is a useful body of data pertaining to domestic water supply and to the characteristics and peculiarities of wells and springs.

THE LOWERING IN WATER LEVEL.

Among suggested causes for lowering in the subsoil-water level is diminished rainfall, either secular or as temporary droughts. So far as secular change in rainfall is concerned, it need only be observed that thus far the steadily lengthening records of the Weather Bureau do not prove it; there is an attractive hypothesis that rainfall is increasing over the Plains with the changes in evaporation and moisture-retention attending settlement and cultivation, and correspondingly decreasing through secondary effects of clearing and cultivation in the eastern part of the country; but thus far the meteorological records

do not establish the hypothesis. The well data indicate that probably in Minnesota and Texas the lowering in water level indicated by the figures was somewhat increased by the droughts of 1910, but that in other sections the temporary rise in water due to exceptional rainfall suffices to balance this effect for the country as a whole. In general it would appear that change in rainfall is negligible as a cause for lowering of the subsoil water.

Locally certain industrial causes for water lowering are clearly recognizable; the lowering of water in wells and springs attending coal mining in Pennsylvania and Ohio, salt extraction in Michigan, and the putting down of large railway, factory, and city wells in several States, with the local lowering due to tile drainage and open ditching in Indiana, Illinois, Michigan, Minnesota, and other States, must be regarded as veritable causes, so far as they go, for the general lowering of the water table indicated by the figures. Yet, with the fullest allowance for local effect, these causes can operate over a relatively small portion only of the entire area affected; there is no perceptible relation between their distribution and that of the water lowering in the several States and regions; and in the aggregate they would appear to explain no more than a minute percentage of the aggregate change. Nevertheless, the factors involved are of much interest in that they indicate the integrity and continuity of the ground level of water in well and swamp and creek, and establish the essential unity of the subsoil water supply.

Another veritable cause of lowering is the actual consumption by men and animals of water taken from the subsoil store either through wells or otherwise. Fortunately the value of this factor can be estimated quantitatively. The population of the 31 typical States giving an average lowering of 9 feet since settlement is about 80,000,000 (in 1910 it was 78,793,764); and assuming that each individual consumes the full adult ration of a ton of water per year, and that domestic animals consume 15 times as much, the aggregate consumption over the 1,734,433 square miles (or 1,110,037,120 acres) would be only 1,280,000,000 tons, or less than 1,000,000 acre-feet. Now 1,000,000 acre-feet over the billion and more acres included in the States would be less than 0.001 foot per year, or 0.08 foot during the average term of settlement of 80 years in which the aggregate loss of water is estimated at 2.25 feet, i. e., on a liberal allowance the consumption of water even by the present population would form less than 3 per cent of the loss indicated by the figures to have been inaugurated soon after settlement and continued to the present time. Of course other uses of water than for potation (ablution, etc.) do not consume the liquid, but return it more or less directly to the common stock (as indeed do perspiration and other physiologic processes much of that used for drink); while the consumption of water in plant growth under artifi-

cial conditions may be balanced against the consumption under the natural conditions existing before settlement. On the whole it would appear that while actual consumption of water must contribute in some measure to the lowering of the well water level, the factor is a relatively unimportant one.

Pertinent suggestions as to the conditions attending the lowering of water level arise in its geographic distribution. Thus in the Eastern coast plain, which lies near tide level and naturally receives both surface and subsurface drainage from the Appalachian region, the rate of lowering is but half that in the neighboring region, and this despite the fact that a much larger proportion of wells in the latter region are so placed (in valleys or on river bottoms) as hardly to be susceptible to change. Within the higher and more broken Southern coast plain the lowering is about the same as in the Appalachian region; but throughout the Interior, where the normal rainfall is less and the changes due to settlement more extensive, the rate of lowering is nearly twice that of the Appalachian belt. Still more striking are the relations brought out in certain States. The largest rate of lowering is in Minnesota, the only State so situated as to receive practically no surface or subsurface drainage from without its borders; next is the neighboring State of North Dakota, receiving but little drainage from without; then (passing over Texas) follows South Dakota, receiving some surface and a good deal of subsurface drainage, but locally wasting wantonly much of the latter; next is Wisconsin, receiving practically no drainage from without and exceptionally well drained by rivers on the one hand and fairly watered by bordering lakes on the other hand; and then comes Iowa, within reach of surface and subsurface drainage from Minnesota, but well drained by numerous rivers. In a general way the rate of lowering in these States is directly correlated with their natural facilities for water supply through surface and subsurface flow and for drainage through rivers and their tributaries; and with a few minor exceptions—and these more apparent than real—the same is true of the other States of the Interior, Appalachian, Ozarkian, and Plains regions. An apparent exception is Texas, ranking third in the order of lowering despite the fact that it is so placed as to receive extensive surface and subsurface drainage from the northwest; but much of the State is in the semi-arid region where the quantity of flow is but limited, while a large part of the recorded lowering is due to excessive draft on comparatively few wells. Viewed broadly, the distribution of lowering throughout that half of the country in which the data are most dependable clearly indicates (1) that the subsoil water of the vast territory between the Appalachian and Rocky Mountains is essentially a unit; (2) that the streams and rivers (including the Mississippi) are but the excess of this water supplemented by storm waste draining away to the sea; (3)

that through the subsoil water reserve the streams are all interrelated; (4) that the source of the subsoil water is local rainfall coupled with surface and subsurface inflow; and (5) that the water table at each point merely marks the balance between supply from rainfall and inflow and escape through drainage or otherwise.

In the light of the suggestions arising in distribution, the most frequently suggested cause for lowering, i. e., changes in natural circulation attending clearing and cultivation, gains force. The great fact is that under the delicate balance between soil and slope and cover toward which nature wrought during the ages before settlement, there was little surface run-off, practically all of the storm and thaw waters entered the duff and soil to escape slowly by seepage into streams and springs, and the subsoil was normally kept surcharged with water often quite to the level reached by the roots of growing plants; while after clearing and under ordinary cultivation much of the storm water is permitted to run off the surface in freshets, not only leaching and eroding the soil on its way, but gathering in the streams in flood torrents and never entering either soil or subsoil to maintain that reserve stock required for full productivity. In a word, it is clear that the lowering of the ground level of water is due mainly not to consumption of the accumulated stock, but to the cutting off of the natural source of supply—to the waste of storm waters through floods in lieu of preventing or compelling them to pass into the soil and enter the normal circulatory system through which alone the waters of the earth can be fully utilized. Locally the water level is indeed lowered by drainage, by mines, by large wells, by excessive draft on wells in artesian districts, and perhaps by other special causes; but so far as may be estimated, at least 80 or 90 per cent of the lowering recorded in 31 typical States is due not to excessive removal of water from the subsoil, but to failure to get a normal supply into the soil and on into the subsoil beneath.

In the light of the distribution and evident chief cause certain idiosyncrasies in the lowering become significant. The figures indicate that generally the lowering is more rapid within the first generation after settlement than later (this is shown by comparing lower and upper Michigan and by comparison of the data for different States—indeed, generally, the rates of change in wells brought out by the figures are greater in the newer than in the older States), which accords with the more sweeping transformation of relations between cover and soil brought about during the first generation through the initial clearing and cultivation than during the average later generation; i. e., it is the time of clearing that most definitely marks the lowering in subsoil water level. Again, the rate of lowering in any county and district and even in each State is conspicuously correlated with the conditions of neighboring territory. A striking exam-

ple is Missouri, in which the records were found so different from those for Iowa and Minnesota as to raise a question of systematic error, until the tabulation approached completion, when an apparent explanation was found in the fact that this State is a direct eastward extension of the Plains, so that its subsoil water supply must be kept up in part by the natural underflow through the Plains from the mountains beyond; an explanation fully established later when the data for Kansas were tabulated. So, too, in Ohio the records were found to show surprisingly few wells lowered, and these by comparatively small amounts; but as the reduction approached completion and as the general unity and integrity of the ground level of water became clear it appeared that the Ohio wells and springs must be maintained in part by slow underflow from Lake Erie toward the deep-cut Ohio Valley—a natural leakage from the lake itself explaining that relatively small discharge through Niagara River which has puzzled engineers and geographers. In like manner lower Michigan, despite local lowering through mining and salt making, gives a less rate of subsidence than Indiana, whose lake contact is less. Again, in Minnesota, Wisconsin, and elsewhere the water level in wells is by common observation directly correlated with the level of the myriad lakelets remaining on the glaciated surface until settlement began and disappearing since settlement in hundreds. Everywhere, indeed, the data indicate that the ground level of water is continuous and that the reservoir of subsoil water whose upper surface forms that level is in constant, albeit slow, movement, passing from land to lake and stream and from lake and stream back to land under hydrostatic laws, and in a general way draining away from and lowering more rapidly at the higher levels as the supply diminishes.

REMEDIES FOR LOSS OF SUBSOIL WATER.

The causes for lowering in the subsoil water level naturally suggest remedial measures. Of course the veritable but minor cause arising in consumption of water can not be removed, since the highest function of water is its use for human welfare; but needless wastes can be prevented by capping artesian wells when not in use and by other self-evident devices adapted to local conditions. Neither can the relatively unimportant lowering due to drainage be prevented without injury to the general welfare; nor generally can lowering due to mining and other industrial operations or of the demands for municipal supply be prevented in accordance with the righteous principle of the greatest good to the greatest number, though it is made more clearly evident than ever before in the light of the data that the water required for the maintenance of human life must be regarded as a common possession to be administered in the common

interest under intelligent laws adapted to modern conditions of life. Thus it is clear that while the nominal right in and to the water of a well pertains primarily to its ostensible owner, this right can not be practically exercised against a community whose methods of agriculture are such as slowly to rob the well of its water or whose deeper wells for town or factory supply tap its springs. Indeed nothing can be clearer from the well records than the fact that the well owners of the country have suffered collectively an enormous loss in the abandonment or deepening of wells, rendered necessary rather by community conduct than by any action of their own; and yet scarcely anywhere, if at all, do owners have legal recourse or the benefit even of general recognition of the principles of equity involved. Manifestly it is desirable that the equitable principles involved should come into general recognition; but this can occur only in the light of definite knowledge of the facts concerning wells, streams, springs, and the subsoil water in their natural relations, to which knowledge the facts and figures herein are a contribution.

The chief cause of lowering of the subsoil water—the waste of storm and thaw waters through surface run-off—is remediable, and with the advance and diffusion of intelligence is bound to be remedied. The waste does no good to anyone; it leaches and impoverishes the soil even where it does not produce visibly destructive erosion; it produces injurious floods, destroying property and endangering life; it transforms streams from features of natural beauty to destructive torrents and forbidding wastes between storms; it impairs the value of the larger waterways as sources of water supply and for power and navigation; in short, surface run-off of storm waters is an unmitigated evil, a common nuisance, and a public injury. It can be prevented—it is prevented in every carefully worked garden, on every intensively cultivated farm, on every well-kept lawn. Indeed it were just as well to face the disagreeable truth that it is commonly permitted only under that slack farming of pioneer type in which the land is skinned for immediate profit rather than cultivated for ultimate enrichment. All that is required to prepare the way for its prevention is enlightened public sentiment, enlarged general knowledge, and quickened national conscience. Both for the public welfare and for the benefit of the owner, each farm should be made to take care of all the water falling on it during the entire year; and all that part of the water not needed for immediate crop growth or cistern or other supply should be so caught and absorbed by mulch or well-tilled soil or contour furrows and ridges as to pass into the ground, there to be stored against need for the steady supply of streams through seepage and for the gradual restoration of the sadly depleted reservoir of subsoil water. Already knowledge and sentiment have been kindled; several States and the Federal Government are putting in

effect plans for reforestation in order to restore the natural conditions about the headwaters in which the navigable rivers find their sources; but the area of crude farming is vastly greater than that of reckless deforestation, and the need is proportionately more acute for the adoption of sound and conservative methods in lieu of those which grew up naturally enough in pioneer days, all the more so, indeed, since it would appear that in extensive districts the lowering has gone so far as to increase the risks and even threaten the very life of farming.

Naturally the remedial methods can neither be adopted nor made effective in a day; time will be required for the advance of knowledge, for the growth of sentiment, and for the development of those regulations required for successful community action. In some cases townships, in others counties, and in still others States will necessarily act in respect to regulations suggested by local or general needs and conditions; in some instances the regulations may relate chiefly to the control of water, in which useful lessons may be borrowed from the arid region in which water is recognized as the real source and measure of life; and doubtless in some instances it will be found expedient to treat as a public nuisance silt-bearing water permitted to flow from an ill-wrought farm over neighboring property—yet all such needful regulations should be foreseen, since they are bound to be made in time, else the natural value on which the productivity and habitability of the country depends will be frittered away and the now fertile acres be made desert.

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